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ALTGELD HALL ANNEX



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Binding department

UNIFORM SYSTEM OF SIGNALS,

As Recommended by John R. Bradwood, State Inspector of Mines of Kansas.

I presume it is one of the duties of the Inspector to make recommendations in regard to the mining law, in order that defects may be remedied and the law made to more fully meet the purpose sought for; also to make suggestions for the addition of new features, when he sees the same are needed.

With this view, I wish to suggest the need of a uniform system of signals to and from the bottom of shafts to the surface at the pit-top, or engine room, where steam is used for hoisting or lowering the cages and their contents. In order to demonstrate the need of such a system of signaling, I shall endeavor to show as clearly as possible where lives not lost can be saved, and where lives lost could have been saved, had the signals been such as I wish to suggest for a uniform system.

In the first place, I wish to call your Excellency's attention to the only provision the law makes concerning signals. In chapter 117, amended law of 1885, section 1, it reads as follows: "And there shall also be maintained the ordinary means of signaling to and from the top of such shaft or slope."

Now the question arises, what constitutes an ordinary signal? In my judgment, it would be anything that every Tom, Dick and Harry might wish to put on, at the least expense. All men do not look at things alike, and if any of them should be called in question about their signals by the Inspector, they would offer a thousand-and-one arguments in favor of their own system. Some people might say that it is the Inspector's duty to regulate those things, and no doubt a great many think so; but I do not. If I understand my duties correctly, I am to see the laws enforced, not to make laws, unless in special cases provided for by the statutes.

Now, to enable me to show further the need of a more safe and uniform system of signaling, I call your Excellency's attention to fatal accident No. 3, reported in previous pages. By referring to the same, it will be seen that Creosta Armand lost his life, partly by his own carelessness, but more by a defective system of signaling than by any fault of his own. But while I say that it was through defective signaling at this place, I wish to state that the same system prevails generally throughout the State where steam is used. It was the first system established in this (Crawford and Cherokee) district, and has been in use so long that it has become a habit, as it were, which is hard to break off.

By referring to the description of the accident, it will be seen that when Creosta Armand came to the bottom of the shaft he gave the bell, or signal, the usual three taps, calling the attention of the engineer to the fact that men were on the cage and wanted to come up. The engineer not being at his lever to respond by lifting away the cage at once, Armand undoubtedly concluded he was not there, so he commenced to climb the shaft above the cage. But it unfortunately happened that the engineer was within hearing distance of the signal, which he proceeded to obey as soon as he could get to the lever of his engine, and on hoisting away the cage it caught poor Armand before he had climbed much above it, and killed him. If Armand had signalled again to the engineer before he started to climb—but this time only 1 bell, 2, this being a signal to the engineer to let the cage remain at rest—the engineer hearing the three bells, would no doubt have heard the two, and would not have moved the cage until he had received further signals to do so. Then Armand could have reached the top of the shaft in safety by climbing. But it so happened, either through his thoughtlessness in not giving the signal to remain still, or through his ignorance of the existence of such a remain-still signal, that he put his life at the mercy of the machinery, and by so doing lost it.

Now, on the other hand, had it been the custom (as it should be) for a back-signal to be given to the men below by the engineer, after they had notified him by signal that they wanted to come up, responding to them that he was at his engine ready to hoist them, they then to give him another signal that they were on the cage ready to come up—if this had been the system used in Armand's case, the engineer, in the absence of a response to his back-signal from the engine room, would not have moved the cage, so that Armand could have reached the top in safety.

This is the first fatal accident that has happened to my knowledge in the State from this cause, defective signaling, but I have personally witnessed many hair-breadth escapes from the same hazard. But as there is any quantity of room for accidents to occur again, if the system of signaling now practiced remains, I think it proper, in view of that fact, to recommend that the law require operators to arrange a safe system as soon as possible. Such a provision of law should have a penalty for non-compliance in every case where steam is used. The signals re-

quired should be loud and distinct. If such a law were in force, a miner moving from one shaft to another could give the proper signals at a strange place the same as if he were acquainted.

I will here give the present and defective system which is used almost generally throughout the state districts. Before giving them, I wish to state that, when the shaft is in operation, the signals from the bottom are under the control and hearing of the coal dumper, (and not in the hearing of the engineer, as they should be.) The engineer has nothing to do with the signals from the bottom, but, on the other hand, pays attention to a signal given him from the dumper, who is liable from the surrounding excitement and noise to give the signal to the engineer to hoist before the men at the bottom are ready. This is another source of danger, and was the cause of another life being lost, as I will show further on. When the shaft is not dumping coal, or not in operation, in the absence of the dumper the engineer attends to the signal from below. Should anyone happen to be in the mine, as there most always is, and as the signal is placed to suit the dumper's hearing, it is in a number of cases heard from the engineer's quarters very indistinctly, so that there is a probability of accidents happening through this cause also.

Here are the present signals: One bell, to hoist coal or other matter. This signal is all right, but it is given to the dumper, not to the engineer, as it should be, and the dumper then gives it to the engineer. One bell, to stop the ascending cage while in motion. This is correct, but it has the same bad feature. Before the engineer will stop his engine, the dumper has to give him the signal, which takes a little more time, and if he has not got his hand on the bell-wire, considerable damage may be done before the engineer gets the signal to stop. This could, to a great extent, be avoided, were the signal given direct to the engineer from the bottom. One bell, to hoist away the last ascending cage that was stopped after leaving the bottom shaft. Two bells, to back down the last ascending cage that was stopped after leaving the bottom of shaft. Three bells, that men are on the cage, wishing to come up.

This last signal has also a very objectionable feature. Supposing a car of coal to have just been sent up, and that before the dumper gets the car off the cage on top, the men wanting to come up step on the opposite cage. The car of coal on the cage above may have jumped the track while the dumper was pulling it off. He gets a lever under one end of it, and raises it on the track. While this is being done, some lumps of coal roll off the car and fall down on top of the men and kill some of them. Accidents of this kind have happened. Most miners do not take risks of this kind until they are sure the car on the cage above has been taken off, but, once in a while, some thoughtless fellow will take the chances, and get on the cage, and in some instance lose his life.

To avoid all these risks, I would suggest that the following be the uniform system required: First, that all signals given from the bottom go direct to the engineer, and not to the topman. Let the topman have a separate and altogether different sounding signal to give from his top to the engineer when he is ready, and that signal govern his own work only, the engineer attending to both signals, and starting his engine only when he has heard both.

1 bell, for coal or debris to be hoisted.

1 bell, to stop ascending cage while in the shaft in motion.

1 bell, to start and hoist the ascending cage that was stopped in the shaft.

2 bells, to back down the ascending cage that was stopped in the shaft.

2 bells, to let cage remain still in the bottom, after it had been rung away.

3 bells, that men are at the bottom of the shaft wishing to come up; and before they step on the cage, let the engineer respond to these three bells with his back signal, giving one bell, as much as to say, "I am ready to hoist you; get on the cage." The men then get on the cage and give the engineer one more bell, as much as to say, "We are all on the cage; hoist us up."

This system of signaling, it seems to me, must prevent a recurrence of the accident before mentioned, and also the accident which I shall hereafter mention. As I stated above, another life was lost by having the signal from the bottom to the topman instead of to the engineer. Julius Herzog came to his death by being caught by the ascending cage, which was hoisted away through an unintended and irrecusable mistake of Theodore Schill, a strange dumper, who gave the starting-signal to the engineer before they were ready at the bottom.

Now it is an indisputable fact to me, as I know it is to many others connected with the coal business, that the engineer about a coal shaft is a man filling a position which is less frequently changed as to its occupant than any other position about the works. Especially is this so as contrasted with the dumper's position, which, I can safely say, is changed ten times for once of the engineer's position. Why is it so?

It is because precautions are used in hiring the engineer. None but the most careful men are employed to take care of the machinery. His careful habits, his sobriety, coupled with his ability to take good care of the engine and boiler, are looked into before he is considered a permanent employee. On the other hand, a strong man with activity to handle the pit-cars quickly, and dump lots of coal in a short time, are the most necessary qualifications of a dumper. And it seems, from a practical view of dumpers in general, that such are the prevailing qualifications, regardless of their carelessness, although all the particulars mentioned are needed, and some have them; but operators seem to pick on the former qualifications first. No doubt it is a prob-

able selection, and would be a sensible and humane one, if the signals were controlled by the engineer instead of the dumper.

I do not mean to say that any operator will intentionally select a man, knowing that he is not capable of taking charge of the signals, but I will venture to say that the selection is made in view of the fact that so many tons of coal dumped by one man more than another means so much more profit for the business. Dumpers can be selected out of any class of workmen around a shaft, but engineers cannot. This is one reason why I discourage the system of having dumpers control the signals, other than their own, from the pit-top to the engineer.

I may state here that a dumper is the worst annoyed man on the whole work, especially if he is kept busy dumping coal. He has a dozen different things to attend to, and, if he is of an excitable temperament, he tries to do them all at once. He is in a manner the telephone exchange of the work. He attends to the signals, pulls the stops to let the cage go, hands in the checks of each car as it is dumped, to the weighmaster, answers calls from the bottom for prop timber, rails, etc., and in some cases greases or oils the cars, and pays attention to car trimmers, etc. And if he don't hurry, he gets his blessings from the foreman. Under these circumstances, why keep other men's lives in his hands by giving him control of the signals? He can hardly be held responsible for a mistake in signaling. From continual annoyance and the rumbling of coal down the chute as it is delivered from the pit-cars, and his over-anxiety to get along with his work, he may imagine that he heard the signal from the bottom, when it was not given. While a man may have all his senses, coupled with ability and carefulness, he still can't help making mistakes in this position at times. Therefore too much care should not be placed on him. He may be in the act of dumping the ninety-ninth car out of one hundred without a stoppage or a break, and in all the ninety-nine cases the signal from the bottom may have been given before he got back to the cage with the empty car, so that he belled away to the engineer as soon as he was ready himself. Such were the circumstances at the death of Julius Herzog. In the putting on of the one-hundredth car, as it were, it jumped the track. He got on the cage to lift it on, and before this was accomplished the dumper had returned with his empty car, put it on the cage, and belled it away, as he had done in the ninety-nine cases before.

I regard the dumper's position, while he has charge of the signals, as the most responsible of any around the works, although it is not rated as such at all places. And in view of those facts, I think it would be a just act of your Excellency to recommend to the Legislature the removal of a responsibility from the dumper where lives are in danger, and the imposing of such responsibility on the engineer, where it really belongs.

To make matters more clear, we will view the engineer's position. He is shut up in his engine room, controlling the death machine, as it were, without the least responsibility of lives in his engine's grasp. He has nothing to trouble his mind but the attention required by his boiler and the throttle of his engine, which he starts when commanded to do so by the signal from the top-man. He has no one to ask him to do a dozen jobs at one time, as it is with the dumper. He is set apart from all other parts of the business, in a house by himself. He has the least to trouble him of any employee around the works. Why not make him the telephone exchange, so far as signals are concerned, from the men below? Let him have a back-signal from his engine room to the surface landing of the shaft in shallow mines; and in mines where it cannot be distinctly heard in the bottom from the surface landing, let it be put far enough down the shaft so that it can be distinctly heard. If such had been the case at the time Julius Herzog lost his life, the probabilities are that he would have been living to-day. Should the engineer think that the signal from the bottom is given, but not be certain, he can quickly find out by asking the men below, as it were, with his back-signal. If they are ready, they will respond; if not, then the bell will remain silent, or they will give the engineer the remain-still signal.

Now the system of signaling that I have recommended is the system used in the large coal districts of Illinois, and from its long use it has been demonstrated to be the best. It would be well, if such a law is made, to require each operator where steam is used, to post up printed instructions and keep them up, both at the bottom and top of the shaft, stating what the signals are, so that strangers coming from other States can educate themselves and avoid giving the wrong signal.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad or the week ending Saturday, July 17, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	61,366-06	1,072,007-09
Shipped South.....	42,408-12	1,547,196-07
Total.....	103,774-18	2,619,203-16
For corresponding time last year.		
Shipped North.....	63,007-06	980,945-01
Shipped South.....	56,782-17	1,201,464-05
Total.....	119,740-03	2,182,409-06
Increase.....		436,804-11
Decrease.....	15,965-05	

ON FANS.

From the Report of Thomas B. Bancroft, State Inspector of Mines in Ohio.

In the last report of this department attention was drawn to the advantages of fan ventilation, as against that by furnace. An experience of thirty years has clearly demonstrated to the writer that economy in cost, as well as in results, is always on the side of the fan, and it has been the aim of the department to introduce fan ventilation in preference to the furnace, whenever it can be done at anything near the first cost of a furnace.

In the record of improvements, given elsewhere in this report, it will be seen than fans are rapidly taking the place of furnaces in the State, and it is safe to say that in every case where the fan has been adopted a return to the furnace would not be looked upon favorably.

The first and also the greatest advantage in the use of the fan, lies in the additional security it affords to life in case of accidents in shaft mines.

Section 297, of the Mining Law, requires that every mine outlet by a shaft, shall have at least two separate outlets "by which shafts or outlets, distinct means of ingress or egress are always available to the persons employed in the mine," etc.

How is it possible in a shaft, ventilated by a furnace at the bottom of the air shaft, to maintain "a distinct means of ingress and egress that shall always be available?" Of what material shall we construct a stairway or ladder which will withstand the action of heated air constantly passing upward? Or (if such structure were possible) in case of accident, where the only means of escape would be by the air shaft, and where every moment of time was valuable in saving life, how could it be expected that men could pass up to the surface in safety through the hot and poisonous gases (the products of combustion) filling the air shaft, to say nothing of the fact that in nine cases out of ten the furnace fires must first be drawn before even the bottom of the air shaft could be reached.

Where a fan is used as a ventilator no difficulty of this sort can exist. A wooden stairway or ladder can be erected in their shaft, which not being exposed to the heat of the furnace, can always be kept available, and nothing would stand in the way of speedily reaching the bottom of the air shaft in case of accident.

It is a question whether, in view of the difficulties of escape by the way of the air shaft, a shaft mine, ventilated by a furnace comes up to, or meets the requirements of Section 297; and should serious loss of life ever occur by this avenue not being available, for the reason stated above, it is probable that the courts would have to construe and decide upon the liability under this section.

The numerous appalling accidents during the past year in neighboring States are well calculated to bring this matter forcibly to the notice of all parties interested. Where life is at stake too much care cannot be exercised, nor can too many legislative safeguards surround the toiler underground in his dangerous avocation.

This section applies to shaft mines only, and it is manifest in shaft mines that this danger of entombing alive exists, while at the same time most of the shaft mines of Ohio are so favorably situated that fan ventilation can be introduced at about the first cost of a furnace.

In most shaft mines of the State the upcast is located close to the hoisting shaft. The steam required to run the fan can, in nearly every case, be taken from the hoisting boilers to the fan engine, the only extra expense being the steam pipe, and its protection against cold that would condense the steam in its passage. Hence, these mines can be ventilated by fan at no extra expense to the operator, and in fact at a saving in cost as compared to the furnace.

That the fan is superior to the furnace, as a means of ventilation, is borne out by the fact of its general adoption in England, and the continent, as well as in the older mining districts of the United States.

In mines generating fire-damp the fan has a decided advantage over the furnace, in that the explosive mixture does not pass over, or near, a fire which may at any moment ignite the gas, and cause immense damage and loss of life. The State of Pennsylvania prohibits, by law, the use of a furnace in mines where explosive gases are generated.

Where black-damp exists in any quantity the furnace is equally objectionable, from the fact that the air to supply combustion is too impure to be of much service, and the furnace fire becomes enfeebled, loses its power, and as a consequence every part of the mine, and every person employed therein suffers from the sluggish current which should, under the circumstances, rather be accelerated than retarded.

Where a fan is used the speed and volume of the current is at all times and under all circumstances under the control of the mine boss. A simple increase or lessening of the speed of the fan brings about the desired results. The current produced by

a fan is more regular in its operation than it is possible to be where a furnace is in use. The speed at which the fan runs being once regulated by the amount of steam allowed its engine, it continues on that motion until changed by the engineer, and a regular and steady current is kept up through the workings, such as cannot be obtained by a furnace dependent upon the care or negligence of a fireman. With this power to increase or lessen the current speedily, and at will, it is evident that we have the course and direction of the air throughout the workings more under control, and the volume can be turned from one part of the mine to another readily as occasion may require.

The direction of the air current in furnace ventilation is toward the furnace and cannot be reversed. In Winter when the guides and cages are clogged with ice, and even the bottom of the shaft freezes up, it is desirable to have the warm air from the mine ascend the hoisting shaft, and by its higher temperature prevent freezing, and the damage and danger attendant thereon. A mere reversal of the fan motion brings about this result, and the mine still enjoys the usual ventilation without, as is sometimes done, drawing the furnace fires, and depending on the natural forces for a supply of air.

Again, in case of fire among the buildings at the top of a shaft where the hoisting shaft is the downcast, and a furnace is in use, the smoke and stythe would naturally be drawn down the shaft and through all the workings to the furnace, and the unfortunate miner would find in either of the two outlets but little chance of escape from suffocation. Were a fan in use, however, a few moments would suffice to reverse the current, and in case of fire at the top, or explosion in the mine, the men employed therein could travel (even in the dark) against the current to the air shaft, every step bringing them nearer to the means of escape.

Another advantage possessed by the fan over the furnace is that, its capacity being increased by increasing the speed at which it runs, it can readily be made to conform to the increased needs of the mine, arising from its development and the increased area of its workings, without any additional expense. With the furnace, on the contrary, the growing needs of the mine can only be met by increasing its size, which can only be done by tearing out and rebuilding, at a cost almost, if not quite, equal to that of a new furnace.

As regards the first cost of a fan it can be said that fans are now constructed complete and ready to set up (including an engine to run them) at about the cost of a properly constructed furnace, and it is certain that a well constructed fan is capable of producing several times the amount of air that a furnace of the same cost could possibly be able to move.

It may be said that where steam can be taken from the hoisting boilers to the fan the first cost of a fan is nothing, or very little, in excess of a furnace. Being once in place the hoisting engineer can attend the fan without extra cost to the operator, as it requires only the necessary lubricating, which with the ordinary wear and tear is, in this case, henceforth the entire cost of ventilation.

The superintendent of one of the largest mines in the southern part of the State informs the writer that it costs them \$300 a year for coal, at first cost, to ventilate their mine with a furnace. When to the cost of coal is added the wages of the fireman, it would appear that a fan, located near the main shaft, would pay for itself, in these items alone, in a year. Where the air shaft is so far from the hoisting boilers that a separate boiler must be used, the first cost of the fan being increased by the cost of a boiler, will probably exceed the cost of a furnace. A portable boiler will, however, be found sufficient for the purpose, and can be obtained at very little expense. While it is true that in this case the expense of a fireman cannot be avoided, yet a great saving in coal will still be manifest, and the advantages secured in the ventilation, as stated above, will, it is believed, still show the fan, under all circumstances, to take the lead in point of true economy.

Fans of from 30 to 50 feet in diameter, with vanes from 6 to 12 feet wide, are quite numerous in Europe. In this country fans of this size are not in general use, twenty feet in diameter and six feet vanes being among the largest. Even fans of the latter size would be larger than necessary in Ohio, and a well constructed fan of eight to ten feet diameter would prove amply sufficient for the largest mines in the State.

A mine manager seldom makes designs of fans. A variety of styles and sizes are offered him and he takes his choice. Several varieties of fans are in use in Ohio, and the comparative values can only be judged by the relative results. The returns made to this department show the amount of air in circulation in each mine, and from these reports it is evident that the mines ventilated by fans are in generally better condition than those where furnace ventilation is used. Likewise the results obtained from the different styles of fans are apparent.

In my last report mention was made of a fan recently introduced, and it is deemed of sufficient interest to all concerned to notice it in this report.

This fan, in construction and proportions, is a "Guibal" fan, which Mr. Murgue, engineer of the colliery company of Besseges, after several years' experimenting with and testing, prefers to any other form of fan. While being as low as any other in cost, possesses two advantages, viz., it is all made of iron and not liable to shrink or crack, as is the case with wood. It is reversed by turning the casing over, and its proper proportions are preserved when acting either as an upcast or downcast. As to its capacity, the returns made to this office show it to be inferior to none.

Chicago.

From the Industrial World.

In accordance with what was expected the feeling in the coal market has been for better business, and there is considerably more demand, especially for the hard coals. The inquiry from the country is improving, and several of the largest dealers have brought in liberal orders. The market is steady, and a better feeling prevails all around. The receipts are fully average. In the matter of values there is little, if any, change since our last review. Lake freights continue to be steady at 40 cents.

The Anthracite dealers report a better demand and an increasing amount of inquiry. Sales seem to be picking up, from the fact that the retail men are, in a measure, coming in with their orders now, in anticipation of a slight rise in prices before the beginning of the month. Country orders are also improving. The demand is about equal to the supply on hand. Quotations remain the same as last week, and are quite liberally shaded.

Bituminous coals are a little slower and not so much in request. Shipments are of an average character only. Values are unchanged and steady.

In coke there is good demand, and the supply on hand is not greatly in excess of the call. Prices are inclined to be a little firmer.

Charcoal is in moderate request, and present no new feature.

In canal coal there is not much doing, and quotations are nominal at old figures.

We quote as follows:

ANTHRACITE.	
Per gross ton by carload, 2240 lbs	
Grate.....	\$ 5 00
Egg.....	5 00
Stove.....	5 88
Nut.....	5 88
Lehigh Lump.....	7 00
Per net ton by carload.	
Grate.....	\$5 00
Egg.....	5 00
Stove.....	5 25
No. 4.....	6 20
Nut.....	5 25
BITUMINOUS.	
Erie & Briarhill.....	\$4 15
Pittsburg.....	3 20
Indiana.....	2 40&2 50
" Slack.....	1 25&1 35
" Nut.....	1 65&1 80
Baltimore & Ohio.....	2 75&2 90
Hocking Valley.....	2 75&2 90
Youghiogheny.....	3 20&3 30
Winnington.....	2 10
Blossburg.....	3 25
Cumberland Smithing.....	3 25
Sonman Smithing.....	3 40
Grape Creek.....	2 00
Fountain County.....	2 00
Clinton Lump.....	2 00
Sixton.....	2 00
Minonk.....	2 00
Morris.....	2 00
CANNEL.	
Kannwha.....	4 50
Buckeye.....	4 25
COKE.	
Connellsville Coke.....	4 85
Crushed Coke.....	6 45
Charcoal, carload per bu.	8 75/8 94

Pittsburg.

From the American Manufacturer.

The Ohio is still too low for sending out coal or bringing back empty cars. There is not much coal mined or loaded along the Monongahela, and only two or three mines are being operated—there are empty vessels at the mines, but stocks and prices in the lower markets are such as to afford very little inducements to operate. Joseph Walton & Co.'s mines, in the Second pool, resumed work on the 13th inst. The firm have a large number of empty craft, which will be loaded at once. John Barrett & Son, of Cincinnati, have purchased the wreck of the Joseph Walton's tow. The stock lost was worth \$9000, and the price paid therefor by the Messrs. Barrett was \$1000. A wrecking boat has started to work to save the coal. At the railway mines the situation has undergone no material change. Prices remain as follows:

PRICES AT PITTSBURG.

River, wholesale, on board.....3 7/8 @ 4 1/4 cts. per bushel.
Railroad.....4 1/4 @ 4 3/4 cts. per bushel.

AT CINCINNATI.

River wholesale, on board.....5 @ 6 cts. per bushel.

AT LOUISVILLE.

River, wholesale, on board.....5 @ 6 1/4 cts. per bushel.

AT NEW ORLEANS.

River, wholesale, on board.....25 @ 26 1/2 cts. per bl.

Bushels are rated among dealers here at 76 lb.,—26 1/2 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lb. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke—The entire situation is about as it has been for several weeks past. All the ovens are going full time, and prices are without change: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

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COMMUNICATIONS.

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FOR THE WEEK ENDING

SATURDAY, JULY 24, 1886.

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THE TRADE OUTLOOK.

The improvement in general business noted the past few months continues, and the prospects of an active Fall trade grow brighter with each succeeding week. The volume of business in nearly every department increases regularly, and although prices do not advance encouragingly a hopeful feeling pervades every branch of industry and trade. Railroad earnings show a marked improvement over last year, although rates are probably no higher than a year ago. This is accounted for, however, by the increase in the volume of business, which at present promises to continue growing during the remainder of the season.

In a few cities Autumn buying has already begun, but this movement is not general as yet, and owing to the confidence with which traders look ahead to it, its coming is awaited with exceptional interest. Some activity has been developed in railroad stocks recently on the strength of improved earnings reported. The steel rail mills indicate their prosperity by increasing the total allotment for the year to 1,400,000 tons, 1,100,000 tons having been already contracted for. Bessemer pig iron is also active at \$19 per ton, its production aggregating 195,000 tons monthly out of 455,000 tons, the total monthly production of Anthracite and Bituminous irons. This is accounted for by the condition of the rail industry, which is so prosperous that notwithstanding the increase in production does not appear to affect prices in the least. Otherwise, however, there does not appear to be any notable change in the iron trade. At Pittsburg sales of furnace stocks have had a slight tendency to depress prices, but there is sufficient confidence in the future to prevent any material decline. At the West transactions are reported at the bottom, with the tendency toward improvement. Production is at the heaviest rate known, but consumption keeps fully apace with it, as the nearly bare yards North and South show. Purchases at present are principally for car works, pipe works and agricultural manufactures. There is also some improvement noted in merchant bar iron at Pittsburg, as to the outlook, but orders have not yet improved materially.

The only discouraging sign developed recently is the large increase in the number of failures reported last week, but this can probably be satisfactorily accounted for. The failures in the United States for the week ending June 16 numbered 189 against 153 for the previous week, 185 for the corresponding week of 1885, and 211 in 1884. The total failures in the United States from January 1 to July 16 numbered 5,775, against 6,616 during the same time in 1885, a decrease of 839. During the same period in 1884 the number was 5,764; in 1883, 5,515; in 1882, 3,872.

A hardening in money in some quarters is also a feature of the present situation, but to what extent this will affect trade is as yet entirely a mystery. It is but natural that rates of interest should increase as business improves and the demand for money begins to grow. Mr. Morrison's resolution directing the Secretary of the Treasury to apply the surplus cash in the Treasury to the payment of the public debt, if finally passed and sanctioned by the President, will have a tendency to loosen money and supply the wants of the increasing trade of the country. There are, however, those who believe, or affect to believe, that the enforcement of the resolution would drive gold out of the country and in effect result in a contraction of the currency. But this is the same argument that was advanced with regard to the continued coinage of silver. Six months ago it was argued that unless the silver coinage laws were repealed gold would be driven out of circulation and the volume of the currency be reduced. The repeal was not passed, and despite the warnings of the coming calamity gold has remained in circulation and has actually continued to accumulate in the Treasury. Nor is there any more danger of a calamity following the passage of the Morrison resolution than there was of its succeeding the defeat of the attempted repeal of the silver coinage laws. The advice, however, offered by those opposed to the payment of the public debt, if followed by the Treasury, might readily result in disarranging values and bringing about a stagnation of business. The New York Herald has advised Secretary Manning to refuse both greenbacks and silver certificates when presented in payment of customs duties. They are now, and have been for nearly eight years, so received, in open violation of law, and the argument is that refusal to receive them now would reduce the surplus in the Treasury and obviate the necessity

for paying the debt or any portion of it. But it is hardly likely that the Administration, no matter how much it might be disposed to resist the resolution, will feel warranted in making an issue of this kind with Congress. If there be no better reason for refusing to receive greenbacks in payment of customs now than that the payment of a portion of the public debt might be resisted or avoided, it is not likely that the country will endorse the advice of the New York Herald in this respect, or endorse the action of the Secretary if he should see fit to adopt it. The final passage of the Morrison resolution would unlock and put in circulation during the remainder of the year fifty million dollars and would relieve the Government of the payment of \$1,500,000 in interest annually.

The Anthracite coal market is dull, as it always is at this time of year, and prices have been shaded somewhat on domestic sales lately, in the endeavor to induce purchasers to come forward. The chief feature of the trade, however, is an encouraging one. From January 1 to July 3 the production had amounted to 15,000,000 tons, or about 2,000,000 tons more than in six months of 1885. In spite of this heavy excess in the output the stocks at shipping points now aggregate only about 600,000 tons against 750,000 tons in January last. The production for August, it is said, will be but 2,500,000 tons, as compared with 3,000,000 tons in August last year. In the meantime a largely increased demand is looked for, and shippers are in hopes of an active trade not later than the latter part of August.

THE KNIGHTS IN POLITICS.

The members of the Central Labor Union, of New York, decided at a meeting held a few days ago that the way to hurry up the changes and reforms for which the Knights of Labor and other labor organizations are contending is to go into politics on their own hook and elect candidates who shall be independent of both the old parties, and be in full sympathy with the principles they represent.

Accordingly it was decided that the various assemblies of the Knights of Labor in the city and the other branches of different trades unions should be informed of the resolution they had adopted and to ask their co-operation in the undertaking, and the outlook now is that New York may have a distinctive labor ticket in the field at the coming election.

This is right. It is extremely doubtful whether any of the principles which the labor unions represent can ever be adopted in any other way. It is with the ballot, and not with the bayonet, that the wrongs of which the workingmen now complain must be redressed.

But can they not be redressed through the two political parties now in existence?

We think not. Whatever professions they may make now they will forget when the election is over.

The workingmen of New York are right. The way to secure the legislation they think necessary is by electing candidates who will represent their views and upon whom they can depend to vote for such measures as are calculated to bring the relief they so much need. The essence of politics is voting, and in this country everybody ought to vote and vote intelligently.

But will they do it? Will the Central Labor Union of New York stand up and vote honestly, conscientiously and decently for the principles they represent and according to their real opinions?

They may, but there is good reason to doubt it. We remember a few years ago that this same body of citizens acting under another name, perhaps, ran a candidate for Mayor of New York, a brilliant and sincere man who represented the views they professed to believe in; yet when election day came they deserted him like frauds and sneaks. In fact it was said that several members of the very committee that went to inform this gentleman of his nomination as a candidate of the Labor party actually found employment for wages on election day in peddling votes at the polls for one or more of the old parties.

Will the Central Labor Union and the auxiliary unions of New York do better now?

We hope so. If they go into politics on this plan they will make themselves contemptible and will deserve the punishment of every honest man's scorn.

The workingmen not only of New York but of the other cities and States as well, have the power

to elect whom they please, but they have made so many flascos in politics that the leaders and shapers of the old parties neither fear nor respect them.

GOLD AND GREENBACK.

"Earliest Millward, of Monongahela City, Pa.," says the *National Labor Tribune*, "on a recent visit to England, was surprised to find that an American greenback dollar was worth more by five per cent. than American gold, and that the greenback was current almost anywhere, while the gold was absolutely refused by many traders. For \$5 in American gold he got an English sovereign, but for a greenback of the same denomination he received \$5.25, and the broker exchanged the greenback for £1 1s 8d."

There is nothing surprising or strange in Mr. Millward's discovery, yet there are those in America who affect a superior knowledge of finance and who will deny its truth. Others will admit it, but they will claim that the pledge of the government to redeem the paper in coin gives it its value. How ridiculous this explanation is we need not state, since the greenback is at a premium of five per cent. above the coin in which it is to be redeemed.

The truth is the convenience of the greenback as a form of money, its trifling cost of transportation, as compared with gold, makes it preferable and brings it to a premium in all foreign countries with which we have commercial relations.

It is a matter of history that during the rebellion, the full legal tender notes, of which there were sixty millions issued, stood at a premium of 2 per cent. above gold coin in Paris and other commercial centres on the continent.

And yet our so called Government of the people cremated hundreds of millions of this money to form a basis for a perpetual bonded debt, that industry might be taxed to pay interest upon it.

As Herr Krupp, of Germany, has made a contract to supply China with 1,500 tons of rails, it is safe to conclude that that country is about to venture on building a railroad. The Government will, most likely, retain complete control of the works, being exceedingly jealous of Caucasian speculators. and some day, perhaps, the Chinamen, profiting by our experience with corporations, may be able to give us some lessons in the management of railroads for the benefit of the whole people. The grant of monopoly privileges or of subsidies hastens the building of railroad lines and the development of a country, but it does not take many years to make the blessing of close communication a burden on the community. The Chinese have been pondering these things and do not propose to give away their country to foreigners.

Liberty and Law.

One hundred and ten years ago, in a small room, fifty-six men signed a paper which brought into being a nation now the most powerful and the most prosperous on earth. The source of the prosperity and the power is known to all the world, and yet there are men who do not comprehend it, even of the citizens who share the blessings and the glories of the great republic. It is a land of liberty, they say, and forthwith they claim the right to take away the liberties of others. It cost a civil war to convince certain citizens of the Republic that liberty did not mean the right to hold other men in slavery. It may cost the conviction and imprisonment of many besides the boycotters sentenced on Friday, to convince leaders of organized labor that liberty does not mean the right to deprive other men of freedom to work. Men who do not comprehend what liberty means, whether they come here from other lands where liberty is not known, or come from parts of our own country where false ideas of its meaning have prevailed, need only the golden rule as an interpreter of the Declaration of Independence. Whenever right one American citizen has by virtue of his freedom, every other also has, and it can never be more than a right to "do unto others as you would they should do unto you." The master would not have thought it a land of liberty for him, if he had been held as a slave, and the boycotter would quickly see and resent the tyranny if all employers should boycott him. But how many there are, who know so little of liberty that they think it a right to do as they please, whether they wrong other men or not! How many there are who think liberty sets up their own will against the law, their own passions, of selfish interests against all restraints, and who count it tyranny if the law will not let them rob others, just as these who deny the laws of God falsely call themselves "free thinkers." It is not that sort of liberty which our fathers proclaimed in Independence Hall. It was not that sort of liberty which they won by heroic endurance at Valley Forge, and by brave exposure of their lives from Bunker Hill to Yorktown. People who

want that sort of liberty are not yet fit for a part in self government, because they have not begun to govern themselves. They are entitled to no share in the glorious heritage of '76, because they deny that equality of rights which is the very corner stone of American freedom. No man has a right to be free who does not respect the right of others to be free, and he who tries to tyrannize over others, or to deny them any rights which he claims for himself, only proves that he has not grown out of mental and moral infancy, and still needs over him the paternal rod of some strong government. A rebellion of slave holders had to be crushed; the would-be tyrants who call themselves labor organizers or socialists, when they try to deprive others of their freedom to work, are as truly enemies alike of free labor and of free government as the slave holders; and the Anarchists who reserve the dungeon and the halter even for Chicago, and at St. Petersburg, because justice at Chicago means respect for the equal rights of all. The great Republic is the world's schoolmaster. As it has taught the nations that free government is strong government, so it must teach those who come here ignorant of freedom, and only wanting to escape from restraints, that the law of equal rights for all and equal justice to all underlies and gives shape to all human laws that have any business to survive. If they cannot obey the law willingly, and respect the right of every other man, laborer or employer, without the restraint of armed policemen and years in prison cells, it goes hard, as in every good school, for those who are slow to learn, but sooner or later, mob tyranny at the South and trades tyranny at the North, denial of freedom to vote or to speak, and denial of freedom to work or to choose workmen for their merit, will go down before the strong and steady hand of "Government of the people, for the people, and by the people," that the doctrine of the Declaration of Independence may everywhere prevail throughout the land.—*New York Tribune*.

HAND GRENADES.

The Newest Form of Effective Fire Extinguisher Driving Out the Old Style—Hose Dispensed With.

National Press Intelligence Company's Special.

NEW YORK, July 20th, 1886.

PROBABLY not more than one-third of the local fires of large cities are ever reported in the newspapers. Nine-tenths of them are officially reported in this city; only the most trivial escape the police and fire department records. There were 2749 distinct conflagrations in the metropolis last year, involving 10,516 buildings, of which 220 were totally destroyed, a loss of about two per cent. of the whole. This speaks well for the New York Fire Department, now recognized as the most efficient on the globe. Yet the official of the Department who gives me these figures and estimates, tells me the engines did not reach the scene of many of the conflagrations reported. The official report itself says that the fifty-three companies comprising the force averaged actual attendance at only 60 out of every 145 alarms. The loss at 1346 or about one-half the fires reported averaged less than \$50, at 748 fires, or more than one-fourth of the whole, the average loss was less than \$10.

"How do you account for this extraordinary showing?" I asked.

"Hand Grenades," was the sententious reply. I had frequently seen the Star Hand Grenades displayed on elevated railway stations, stables of the great horse car companies, in railway, passenger and sleeping cars at the Post Office and its branches, in all our local public buildings; and in the various public departments at Washington; but I had no idea that this newest form of fire extinguisher had proved itself of such positive practical value. I find, however, on inquiry from other sources than the Fire Department official I have already quoted that they have done signal service here as a swift and handy means of smothering embryo fires. The *World* office was saved by a Star Grenade a short time ago. So was the large printing house of Martin B. Brown, who does all the city printing. So also was the Colonnade Hotel, Tallett's chair factory, Huppel's big brewery, Judd's factory. In Boston the United States Hotel, and Jordan, Marsh & Co.'s great dry goods store, and in Albany the residence of Bishop Doane, were recently saved from destruction by the same means. The Interior Department at Washington supplies these grenades to various stations in the far West, and recently they were the means of saving the Indian School building at Albuquerque, New Mexico. The War and Navy Departments also supply them to army posts, naval stations and war ships. Some of the architects of the big new buildings projected are taking the hand grenade into consideration and furnishing niches in the walls for their convenient storage. They are not at all unsightly; on the contrary they are rather ornamental when conveniently hung in the wire rack, made to hold them against the walls of buildings.

This form of fire extinguisher is comparatively new. I think this is the third year since it was in-

troduced. It seems to be driving out of use the more cumbersome extinguishers which consist of a portable tank charged with acids and which requires a hose to properly dispose of the extinguishing fluid. The Hand Grenade does away entirely with hose. It consists simply of a glass bottle, charged with some chemical fluid whose component parts I don't know, but which on being released by the breaking of the bottle vaporized into immense volumes of gas which at once smother combustion. The bottle is hermetically sealed, the chemicals do not deteriorate with age, and the bottle never needs recharging. It will not freeze at any temperature above 20 degrees below zero. I believe it will freeze at 43 degrees below, but nobody will want to use it to put out a fire when it is that cold. The bottle is not more than a half foot in diameter. A child can throw it at least ten feet. It breaks at the slightest concussion. It is not dangerous to handle as it neither stains or burns flesh or fabric of any kind. One can stand over an incipient fire with a bottle in each hand and break one over the other without the slightest risk from the fluid or the gas it generates, and which disappears as soon as it has done its work without leaving any mark of its presence. Of course such an agency as this is found in time to revolutionize our methods of fighting the flames.

I believe there are several of these companies all have bottles patterned after that of the star. The cut will indicate the general style of the original and its imitators. Mr. H. L. Doolittle, the manager of the Harden Star Hand Grenade Fire Extinguisher Co., of Chicago, has an office at No. 33 Barclay street, in this city. He tells me that it is the oldest and best in existence and sends its products to all parts of both hemispheres. In New York thousands of factories, public buildings and residences are protected by its hand grenades. "Ours is the only hand grenade," said Mr. Doolittle "recognized by the United States Government. Ours needs no recharging and is always ready for good use. We guarantee the fluid will not freeze above 30 degrees below zero. Oh! of course a bottle broken is gone forever, but they are so cheap that in case of a fire one can afford to use them unsparingly." It is a question how far the use of such simple and cheap fire extinguishers are to revolutionize public fire service. It would be a great simplification of fire departments if steam engines, hose carriages, and water itself should be dispensed with, and the force employed to batter down flames with hand grenades filled with a gas producing compound.

W. F. G. SHANKS.

The National Press Intelligence Company, No. 26 Church street, New York, reads 1,500 papers daily for busy men, firms and corporations for articles, advertisements, etc., in which they are interested. Thousands employ it. Send for circular.

Anthracite Coal Tonnage.

The following is the statement of Mr. John H. Jones, of the Anthracite coal tonnage for the month of June, 1886, compared with same period last year.

This statement includes the entire production of Anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines.

	JUNE, 1886.	JUNE, 1885.	DIFFERENCE.
Phila'da. & Read.R.R.	1,034,213 05	935,417 06	98,795 10
Lehigh Valley R.R.	464,212 03	470,917 13	6,705 10
Del. Lack. & W. R.R.	368,273 08	392,572 08	4,299 00
Del. & Hud. Canal Co.	229,984 04	255,415 17	25,431 13
Pennsylvania R.R.	307,422 19	322,851 14	15,429 15
Penn'a. Coal Co.	115,544 07	106,786 12	8,757 15
N.Y., L. E. & W. R.R.	49,667 17	46,940 11	2,727 06
Total.	2,593,318 03	2,490,032 01	103,286 02

	FOR YEAR 1886.	FOR YEAR 1885.	DIFFERENCE.
P. & R. Railroad	5,096,002 19	4,727,792 18	368,210 01
L. V. R. R.	2,811,970 12	2,830,014 01	18,043 08
Del. L. & W. R.	2,417,665 07	1,927,877 01	489,788 06
D. & H. Canal Co.	1,669,203 18	1,310,966 19	358,236 19
Penn'a. Railroad	1,609,069 17	1,550,505 10	58,564 07
Penn'a. Coal Co.	828,535 14	568,821 03	259,714 11
N.Y., L. E. & W. R.	336,927 05	259,802 03	77,125 02
Total	11,523,375 12	12,701,322 01	1,177,946 11

The stock of coal on hand at date of water shipping points, June 30th, 1886, was 700,736 tons; on May 31st, 1886, 614,451 tons; increase, 86,285 tons.

A NUMBER of London engineers are discussing the probability of crossing the Atlantic in three days. The engines capable of making forty knots an hour would have to reach a capacity of 30,000 horse power. What vast quantities of Anthracite coal would be consumed on such trips.

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F. M. Co. Box 115, Newport, Ky.

CORRESPONDENCE.

THE LABOR MOVEMENT.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Miscellaneous Questions and Answers.

Editor Mining Herald and Colliery Engineer:

SIR:—Please answer the following questions:

1.—What is to be understood by "chogs" as used in the mines of Yorkshire, England?

2.—What is meant in mining by the term "Brattice?"

3.—What is the meaning of the term "Benching?"

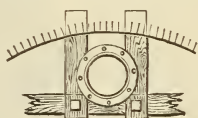
4.—What is a "Balance Bob?"

Respectfully Yours,

LEARNER.

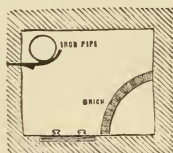
Shamokin, Pa., July 10, 1886.

Ans. 1.—"Chogs" are blocks of wood placed in



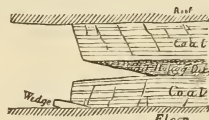
shafts to keep the column pipes of pumps in place. (See diagram.)

2.—"Brattice" means any division or partition in a shaft, gangway or other underground place, for conducting an air current, by dividing the place into two parts, one for ingress of fresh air and one for egress of the vitiated air. A brattice may be built of stone or



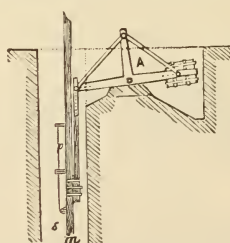
brick, may be constructed of wood or canvass cloth nailed to supports or by sheet iron tubes erected along the side. The diagram illustrates an arched brick and a sheet iron pipe brattice as sometimes applied in a main level.

3.—"Benching" is the operation of lifting the bottom part of the coal seam with wedges, after it has



been "holed" or under-cut in the middle or on the top, as shown in the diagram.

4.—A "Balance Bob" is a large beam or lever attached to the main rods of a Cornish or other pumping engine, the one end being attached to the



rods by a connecting rod, and the other fitted with a strong box which is loaded with pieces of old iron to form a counterpoise to balance the weight of the rods. The general features of their construction is illustrated by the diagram which shows a balance bob fitted to rods in a shaft, giving a profile of the recess in the side of the shaft where it is fixed.

Stated by H. B. Coohran, druggist, Lancaster, Pa. "Have guaranteed over 300 bottles of Burdock Blood Bitters for dyspepsia, sour stomach, bilious attacks, liver and kidney troubles."

Involving More Than the Mere Question of Wages.

New York Sun.

The contests which have lately been going on in various parts of the country between laborers and employers involve much more than the mere question of wages and hours of work. They are the result of an effort to establish a principle which, carried out to its logical consequences, would revolutionize society and reconstruct the social fabric on an entirely new model.

The immediate end which the Knights of Labor and their associates have in view is the consolidation of all working of all trades into one compact whole, so that they may dictate terms to employers with irresistible power. Evidently, if there were no men asked to be employed except those who belonged to a single organization, employers would have to submit to the terms that the organization might impose. Labor would deal with capital as a unit and not as a multitude, and there would be none of that competition between individual laborers upon which employers in times past have relied to give them the control of the labor market. If the men of all the trades could stand shoulder to shoulder, the weaker among them would be strengthened by the assistance of the stronger, and the united body would thus be enabled to defy the pressure of a necessity which might force the individuals to succumb.

The main obstacle to the attainment of this perfection of workmen is, as recent events demonstrate, the unwillingness of all of them to submit to the restraints which it necessarily involves. Some of them object to the pecuniary tax upon their earnings, and some to the needful restrictions upon their personal freedom. It is like enlisting for a soldier; let the pay and rations be ever so good, the discipline is irksome. Hence come the numbers of non-union workmen, whose readiness to accept employment has seriously interfered with the efforts of the unions toward getting better pay, better treatment, shorter hours and similar advantages.

The peculiarity of the recent labor troubles is the progress which they show the workmen to have made toward overcoming this obstacle and sweeping the independents into their organizations. This they have effected partly by persuasion, but also partly by the pressure of intimidation. Union workmen have been able to deal with non-unionists very much as during the war, loyal Northerners dealt with copperheads and as Confederate Southerners deal with their dissident fellow citizens. Mr. Seward's little bell was not only tolerated but approved here, and the able-bodied man at the South who failed to take up arms or to contribute money to the Confederate cause had his life made a burden to him. By the use of similar means the Knights of Labor evidently hoped to succeed in compelling every earner of wages to join them.

For the present the movement has been checked. The strikes and the tie-ups have failed, and business affairs are resuming their former condition. But it would be a mistake to assume that the purpose of the Knights has been abandoned and that they will not renew their efforts to accomplish it at the first favorable opportunity. What would be the result if they should ultimately succeed. Undoubtedly, the first point gained would be that working men would secure uniform high wages, easy hours, and, possibly, the whole of the profits, of which they have hitherto been obliged to allow employers to keep a share. But how long could they continue to find employment on these terms. Employers are human beings like themselves, and are as little disposed to toil without recompense. They will not conduct their business from merely philanthropic motives. They must obtain enough profit to make it worth their while to go on and furnish work for the workers, or they will retire from the field. Then the workmen must either take up the business and carry it on themselves, borrowing the necessary capital, and hiring managers, or else they must allow their old employers an equivalent for their services and for the use of their capital. In neither case would there be any practical improvement upon the present system. Whoever conducted the business, whether as salaried manager or as employer, would struggle to get all he could, just as he does now, and the same disputes would come up over again that we now see.

A more serious result of the complete enrollment of all workmen into a single organization would be the increased responsibilities of the body toward its individual members. The aid now temporarily extended to unemployed men would have to be provided for permanently and systematically. If the scale of wages adopted by any branch of trade should, in consequence of business depression or any other reason, be higher than would allow all engaged in it to get work, justice would require that those who suffered from the maintenance of the scale should receive compensation or in some way be taken care of. When the burden thus imposed became too heavy there would have to be a readjustment of rates in order to lighten it, since evidently, it would be better to reduce wages to a point at which all could find work than to take from the employer the difference between that and a lower point and hand it over to the unemployed. This, again, would bring us back to the same process of adjusting wages according to supply and demand that now prevails, and workmen would get there,

as they do now, no more than their work can be made to command in the market.

Corresponding to the duty of the united body of workmen to see that all its members get wages either with or without work is its right to have the power of enforcing the measures necessary for carrying out its purposes. It must be able to punish for violating its orders both its own members and those who, though not its own members, encourage such violations. Hence penalties such as boycotting and personal chastisement, which are now unlawful would have to be legalized and, of course, to be regulated by law. There would have to be Courts for the trial of offenders, and all the formalities which are now observed in criminal proceedings for the protection of those who are wrongfully accused. This, gradually, would produce a code of procedure of offenders against the laws of the organization, and, necessarily, such modifications of existing laws as conflict with them. How much short this would be of erecting the workmen into a sovereign community, and constituting them an independent State within the State, is not worth discussing. Since, too, the whole body of citizens would be interested in the matter, indirectly if not directly, it would be more convenient to make it as a whole subject to the existing Government machinery, and let the State and National Legislatures regulate wages and hours and terms of employment just as they now regulate the rate of interest, the affairs of railroad and gas companies, and other matters of general concern.

From this last point to that of the State management of all great industries would be a short step. When the people, by their duly elected representatives, had assumed the control of work and wages it would be easier for them to take charge, also, of the employing of workmen and the distribution of the product of their work than to leave them in private hands. Competition among the employers being made impossible, competition among employers would lead to the ruin of all but the most skillful of them, and the consequent non-employment of a large portion of the workmen. Railroads would be the first to be taken in hand by the State because of their great public utility, the telegraph would soon follow, and then would come flouring-mills, abattoirs, cotton and woollen factories, iron-mills, and so on, until only small shopkeeping would be left to individual enterprise.

When this result had been accomplished there would arise the same party divisions and the same party struggles for the control of public affairs which now prevail, but with vastly stronger incentives to personal ambition. The control of the great State industries would be a prize far more attractive than any which politics now offers. Economical problems now enter largely into legislation, but they would then almost monopolize it, and the people's representatives would have to discuss and to decide questions vastly more difficult than any which have yet been submitted to them. The obstacles in the way of a wise solution of these questions would be no less than they are now, and the blunders that would be made in dealing with them are easy to imagine.

Suppose, however, that the political machine in its new form could be made to work smoothly. Suppose that an end had been put to poverty and the sufferings that poverty causes, that the great fortunes which now provoke so much hatred were divided up, and that all incomes were reduced to moderate amounts such as our present Government allows its officials, the highest of which, except that paid the President of the United States, does not exceed \$20,000 a year. What then? What would, in the first place, become of all the trades and occupations which now depend upon the expenditures of the rich? Jewelers, goldsmiths, upholsterers, painters, sculptors, culinary artists and all the other purveyors of luxury would be without customers. There could be no galleries of costly paintings and sculptures, no peach-blow vases, no Italian and German opera, no finely illustrated books, no refinements of any kind which require wealth for their development. Plain houses, plain fare, plain clothing, and only the simplest forms of pleasure and recreation would exist. With the disappearance of competition the usual incentives to improvement would also disappear, and innovations upon established methods and processes would be resisted as they always are by government officials and society, in a short while would relapse into the condition from which it began to emerge thousands of years ago, with the prospect of retrograding rather than of advancing. In getting rid of the distinction between the rich and the poor, and the unhappiness which that distinction entails, we should also lose its advantages. We should have the benefits of equality, but we should also have the stagnation which equality produces.

To sum all up: The principle for which the Knights of Labor are contending leads directly to a State Socialism which has been, for years, the dream of European theorists, but which is utterly opposed to all American political ideas, and has not yet found much favor in this country. Unless our workmen are prepared to endure the necessary evils of such Socialism they ought not to favor the measures that will produce it. Seductive as may be the idea of regulating all work and wages which is offered by the scheme of a universal union of all workers for wages, the gift cannot be accepted without also accepting the burdens it would impose. On the one side are individual liberty, competition, suffering, with social progress; on the other side the merging of the individual in the mass, deliverance from struggles and anxiety, but at the same time the arrest of all social development and of all ambition and hope for improvement in the future.

Ohio Mining Law.

(Continued from page 250.)

SEC. 299. The owner or agent of every coal mine operated by shaft, in all cases where the human voice cannot be distinctly heard, shall forthwith provide and maintain a metal tube from the top to the bottom of such shaft suitably calculated for the free passage of sound therein, so that conversation may be held between persons at the bottom and top of the shaft; there shall also be provided an approved safety-catch, and a sufficient cover overhead, on all carriages used for lowering and hoisting persons, and in the top of every shaft an approved safety-gate, and an adequate brake shall be attached to every drum or machine used for lowering or raising persons in all shafts or slopes; and there shall also be provided in every shaft a traveling or passage way from one side of a shaft bottom to the other, so that persons working therein may not have to pass under descending cages.

SEC. 300. No owner or agent of any coal mine operated by a shaft or slope shall place in charge of any engine used for lowering into or hoisting out of such mine persons employed therein, any but experienced, competent and sober engineers; and no engineer in charge of such engine shall allow any person, except such as may be deputed for that purpose, by the owner or agent, to interfere with it or any part of the machinery, and no person shall interfere or in any way intimidate the engineer in the discharge of his duties; and in no case shall more than ten men ride on any cage or car at one time, and no person shall ride upon a loaded cage or car in any shaft or slope.

SEC. 301. All safety lamps used for examining coal mines, or which are used in any coal mine, shall be the property of the owner of the mine, and shall be under the charge of the agent thereof, and in all mines, whether they generate fire-damp or not, the doors used in assisting or directing the ventilation of the mine, shall be so hung and adjusted that they will shut of their own accord and can not stand open, and the mining boss shall keep a careful watch over the ventilating apparatus and airways, and he shall measure the ventilation at least once a week, at the inlet and outlet, and also at or near the face of all the entries, and the measurements of air so made shall be noted on blanks, furnished by the Mine Inspector; and on the first day of each month, the mining boss of each mine shall sign one of such blanks, properly filled, with the said actual measurements, and forward the same to the Mine Inspector.

SEC. 302. No boy under twelve years of age shall be allowed to work in any mine, nor any minor between the ages of twelve and sixteen years, unless he can read and write, and in all cases of minors applying for work, the agent of such mine shall see that the provisions of this Section are not violated.

SEC. 303. In case any coal mine does not, in appliances for the safety of the persons working therein, conform to the provisions of this chapter, or the owner or agent disregards the requirements of this chapter, any court of competent jurisdiction may, on application of the Inspector, by civil action, in the name of the State, enjoin or restrain the owner or agent from working or operating such mine, with more than ten miners at once, until it is made to conform to the provisions of this chapter; and such remedy shall be cumulative, and shall not take the place of or affect any other proceedings against such owner or agent authorized by law for the matter complained of in such action.

SEC. 304. When written charges of gross neglect of duty or malfeasance in office against any Inspector is made and filed with the Governor, signed by not less than fifteen coal miners, or one or more operators of mines, together with a bond in the sum of five hundred dollars, payable to the State, and signed by two or more responsible freeholders, and conditioned for the payment of all costs and expenses arising from the investigation of such charges, the Governor shall convene a board of examiners, to consist of two practical coal miners, one chemist, one mining engineer, and one operator, at such time and place as he deems best, giving ten days' notice to the Inspector or against whom the charges are made, and also to the person whose name appears first in the charges, and the board, when so convened, and having been first duly sworn, truly to decide the charges made, shall summon any witnesses so desired by either party, and examine them on oath, which may be administered by any member of the board, and depositions may be read on such examination, as in other cases; and the board shall examine fully into the truth of such charges, and report the result of their investigation to the Governor, who shall award the costs and expenses of such investigation against the Inspector or the persons signing the bond according to their finding, against said Inspector or in his favor, which costs and expenses shall include the compensation of such board, of five dollars per day for each member, for the time occupied in the trial, and in traveling from and to their homes; and the attorney-general shall forthwith proceed to collect such costs and expenses, and pay the same into the State treasury, being in the first instance paid out of the State treasury, on the certificate of the president of such board.

SEC. 305. In all coal mines in the State, the miners employed and working therein, the owners of the mine and other persons interested in the rental or royalty of any such mine, shall at all proper times have full right of access to and examination of all scales, machinery or apparatus used in or about such mine to determine the quantity of coal mined,

for the purpose of testing the accuracy and correctness of all such scales, machinery or apparatus; and such miners, landowners, or other persons, may designate or appoint a competent person to act for them, who shall at all proper times have full right of access and examination of such scales, machinery or apparatus, and seeing all weights and measures of coal mined, and the accounts kept of the same; but not more than one person on behalf of the miners collectively, or one person on behalf of the landowners or other persons interested in the rental or royalty jointly, shall have such right of access, examination and inspection of scales, weights, measures and accounts at the same time, and that such person shall make no unnecessary interference with the use of such scales, machinery or apparatus; and the miners employed in any mine may, from time to time, appoint two of their number to act as a committee to be furnished by said Inspector for that purpose, and if such committee make to the Inspector a false or untrue report of the mines, such act shall constitute a violation of this Section.

SEC. 306. The provisions of this chapter shall not apply to or affect any coal mine in which not more than ten men are employed at the same time; but on the application of the proprietor or of miners in any such mine, the Inspector shall make, or cause to be made, an inspection of such mine, and shall direct and enforce any regulations in accordance with the provisions of this chapter that he deems necessary for the safety of the health and lives of miners.

SEC. 6871. Whoever knowingly violates any of the provisions of Sections two hundred and ninety-eight, two hundred and ninety-nine, three hundred, three hundred and one, three hundred and two, and three hundred and five of the revised statutes, or does any act whereby the lives or health of the persons or the security of any mine or machinery are endangered, or any miner or other person employed in any mine governed by the statute, who intentionally and wilfully neglects or refuses to securely prop the roof of any working place under his control, or neglects or refuses to obey any order given by the superintendent of a mine in relation to the security of the mine in the part thereof where he is at work, and from fifteen feet back from the face of his working place, shall be fined not more than fifty dollars, or imprisoned in the county jail not more than thirty days, or both.

TO PREVENT THE PAYMENT OF WAGES IN SCRIP, OR SELLING GOODS TO EMPLOYEES AT EXCESSIVE PRICES.

SEC. 7015. A person who, or a firm, company, or corporation which, issues, uses, or circulates any scrip, token, check, draft, or certificate of indebtedness, payable otherwise than in money, or designed, intended, or calculated to be issued, used, or circulated as money, or in lieu of the lawful money of the United States, or pays the wages of labor in goods or supplies through the intervention of scrip, or any other evidence of indebtedness, or otherwise, at higher prices than current cash rates for like goods and supplies at the nearest retail market increased by the cost of transportation from such nearest retail market to the place of sale, or sells goods or supplies to laborers on orders, or other evidence of indebtedness, issued to such laborers by their employers, or by any arrangement with their employers, by which such laborers are to receive such goods or supplies on their wages at such higher rates, shall be fined not more than one hundred nor less than five dollars.

SEC. 7016. Whoever compels, or in any manner seeks to compel, or attempts to coerce, an employee of any person, firm, or corporation, to purchase goods or supplies from any particular person, firm, or corporation, shall be fined not more than one hundred nor less than twenty dollars, or imprisoned not more than sixty days, or both.

SEC. 7017. The prosecuting attorney of any county, upon complaint made to him of any violation of either of the two preceding Sections within his county, shall cause such complaint to be investigated before the grand jury.

(To be Continued.)

Copies of the New Mine Law.

We had printed a large number of both the new Anthracite and Bituminous mine laws of this State for sale at this office, but we found the demand for them so large that both have already been completely exhausted. We therefore printed another and larger edition of each of the laws mentioned for those who desire them. They have been carefully read and compared with certified copies from the Governor. The price per copy of either the Anthracite or Bituminous law is only 10 cents. Not a single miner in the State can afford to be without the law affecting the region in which he resides.

CONTINENTAL COLLIERY NOTES.

Extracts From Papers Written by Geo. E. Andre, P. G. S., M. E., &c., for the "Colliery Guardian" of England.

The colliery explosion which occurred on the 24th ult. at Ronchamp, near Lure, in the department of the Upper Saone, France, is one of those "accidents" which happen from time to time to keep us in mind of the fact that our boasted progress in knowledge, and marvellous achievement in mechanical contrivances have done little or nothing towards removing the dangers to which the miner is exposed. Government commissions sit for years and end their labors with an elaborate report of their discoveries. For a while the matter is made the subject of discussion, and then allowed to slip out of mind till some disaster comes to again direct attention to it. Then we have more talk; and again the matter is forgotten. The worst of it is that during all this time we persuade ourselves that we have profited by the knowledge gained, and done our best to turn it to useful account. To what action, for example, is the latest of these "reports" leading? Has anything been done towards the substitution of better safety lamps for those which have been shown to afford in certain circumstances no safety at all? Has any change been anywhere made in any particular of the management or working of a mine in accordance with the recommendations of the investigators? I ask these questions because in my recent wanderings I have sought to discover where and how the recommendations of the German and English Commissions have been followed, and I have found but one instance, that of the watering at Lievin to which I alluded last week, in which a change has been made in consequence of those recommendations. It may be easy to justify this neglect of the suggested means. I merely note the fact that they are neglected, in connection with the other too obvious fact that explosions continue to happen.

As long as mining engineers regard an abundant and well-directed ventilation as sufficient to secure immunity from explosions, the danger will continue to exist. No ventilation that ever was or can be devised will prevent an explosive mixture forming in some part of the workings in certain circumstances that may at any time occur. We have had several painful proofs of this truth of late. The most recent is that afforded by the Ronchamp disaster of last Thursday. The mine in which the accident happened is famous for the excellence of its system of ventilation. There is an abundance of air and the currents are skillfully directed. It was just such a case as would have satisfied those who put their whole trust in ventilation. Yet an explosion of extreme violence took place in one of the main ways, killing twenty-six out of twenty-seven men present. So great was the violence of this explosion that the shock was felt at surface more than a mile from the shaft.

I cannot understand the apathy which leaves the electric lamp untried. There cannot be an explosion without the means of igniting the gases, and the electric lamp may be hermetically sealed. It will be answered, I daresay, that no suitable lamp exists. The sense of this answer rests upon the signification of the word "suitable." When the objections are sifted down it comes to this. As now constructed these lamps require more attention at surface than the oil lamps, and they are too heavy. Now, do our miners hope to get something for nothing? It is reasonable to expect the electric lamp to unite all the advantages of oil lamp to its own? What is the importance of a little additional trouble that it should turn the balance against the security of human life. Besides, it has not yet been shown that the lamp is more troublesome to charge and clean. And if it were, the objection would probably be speedily removed if sufficient encouragement were given. As for the objection of weight, it is too childish to be thought of with patience. When our miners have become so feeble that they cannot carry a lamp of 5 lb. or 6 lb. weight, it will be about time to give up coal raising and to let the foreigner work in their stead. It is sickening to hear the degenerate sportsman of the present generation groan under the weight of a flimsy gun, and to see him blow off his finger with a burst barrel rather than burden himself with half the load his father carried with ease. But when a miner begins to complain of the weight of a 6 lb. lamp, I feel, as Jonas Cobler felt when the effeminacy of his son peeped out through his kid gloves, "downright bad."

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

MINING NEWS.

Pennsylvania—Anthracite.

The work of rebuilding the breaker at Alaska shaft, near Mt. Carmel, which was destroyed by fire about six weeks ago, is being pushed with all possible haste and vigor. The foundations have been completed and the work on the shaft soon to be commenced. The large amount of timber required for the work and the difficulty in obtaining it of the proper quality and dimensions, has delayed the work somewhat. Meanwhile, however, it is being framed as rapidly as received, and the officials are still confident that the time originally set for the completion of the structure will see it ready to prepare coal for the market. The breaker will be one of the largest and best equipped in the Anthracite coal regions.

Pennsylvania—Bituminous.

A. W. Mellon, of Pittsburg, has placed on record in Westmoreland county, 25 deeds for tracts of coal underlying property in Mt. Pleasant and Unity townships. The transfers embrace tracts varying in size from 237 acres to 1½ acres, and represent a total of 1,813 acres, at a total cost of \$105,903.

Nearly all the miners along the Baltimore and Ohio Railroad are working now, excepting those belonging to W. L. Scott. The miners in Scott's employ refuse to sign a contract, which it is said stipulates among other things that they shall never join any combination of men for the purpose of advancing wages, which shall always be the same as paid by the Westmoreland Gas Coal Company. The miners are determined, and a long strike will probably result.

"The coking interests centred in what is known as the Connellsville region of Pennsylvania," says the *American Manufacturer*, "are so much more important than those of any other section, not only of Pennsylvania, but of the United States, that but few not intimately acquainted with the facts are aware of the extent of the coke interest of other localities in Pennsylvania. That these interests are by no means inconsiderable may be inferred from the fact that the production of coke of this State outside of the Connellsville region is very nearly equal to that of all the remaining States combined. The production of coke in the United States in 1885, according to the preliminary report of Joseph D. Weeks, agent of the United States geological survey, was 5,106,696 net tons. Of this Pennsylvania produced 3,991,805 tons, of which the Connellsville region produced 3,046,012 tons. This would leave as the production of Pennsylvania outside of the Connellsville region, 935,793 tons, while the total production of the United States outside of Pennsylvania was but 1,114,891 tons, or in other words, the production of the United States outside of Pennsylvania was about 200,000 tons more than the production of Pennsylvania outside of the Connellsville region. Some of the coking sections of Pennsylvania outside of the Connellsville region are well known and have been comparatively large producers for some years. Among these are the Irwin-Latrobe, with its nearly 1,200 ovens stretched along the line of the Pennsylvania Railroad from Larimer to Blairsville, producing some 220,000 tons of coke. Just east of this, still along the line of the Pennsylvania Railroad, are the more than 500 ovens of the Allegheny mountain region in Blair, Cambria and Somerset counties, producing some 200,000 tons of coke yearly. In the Broad Top region, supplying its furnaces, are some 530 ovens, producing 150,000 tons of coke yearly. In the region, in the northern part of the Allegheny mountain coal-fields, there are 236 ovens, but owing to various reasons their production has lately declined. The same is true of the 200 ovens in the Allegheny valley, the 400 ovens in the neighborhood of Pittsburg, and the 89 ovens in Beaver county. There are two coking districts, however, that have lately assumed and are rapidly increasing in importance, namely, the Snow Shoe and Reynoldsville districts. In both of these districts the number of ovens and the production of coke have increased rapidly within the past year. In the former, the Snowshoe, there are some 250 ovens, and in the latter 600 erected and 143 in course of construction. In the Snowshoe district, the Urvon Coal Company, which mines the Big Moshannon seam, is making a hard cellular coke, low in sulphur and free from phosphorus. The fixed carbon in this coke is given as 88.964, and the ash as 10.173, sulphur, 10.775. In the Reynoldsville district, the Connors and Pittsburg Coal and Iron Company, who had at the beginning of the year a plant of 356 beehive ovens, and who proposed increasing the number to 500, are making coke from the Lower Freeport coal, which, outside of the Pittsburg area, is the best bed of Western Pennsylvania. This coal requires no washing, being coked, as is the Connellsville, in its natural state as it comes from the mines. Analysis of the coke shows an average of 88½ per cent. of fixed carbon, with 9½ per cent. of ash, a little over 1 per cent. of sulphur, and .068 of phosphorus."

Other States.

In boring for water at the fair grounds in Paris, Ill., a seam of coal was struck at a depth of forty feet.

The old Clark mine, at Chapman, Ohio, which has been filled up with water for a number of years, is to be reopened. It is said that there is considerable pillar work there, and in the old Sprinkle mine adjoining, which is to be worked also by this new company.

The Ohio Creek Anthracite Coal Company, Colorado, has been organized; capital, \$25,000; incorporators, J. F. Schoellkopf, W. L. Youle, John Hanenstern, Segnitz, J. H. Gaenssler; place of operations, Gunnison county.

The several coal mines in Weld county, Col., have ordered ventilating fans for the better ventilation of their mines, and for the safety of their miners in making their escape-shaft to them always available, in case of any emergency, with a hoisting-shaft. This important matter has been caused through the efforts of Inspector of Coal Mines John McNeill, who held that an escape-shaft is not available where a ventilating furnace is located and in use at the bottom of an escape-shaft. It is expected that all coal mines using furnaces will adopt the same measure where only two openings are used for ingress and egress in the mines.

The syndicate recently formed to purchase, if possible, all the mines lying in the territory between Danville and East St. Louis, has purchased the Ridge Prairie and O'Fallon mines at a cost of about \$3500. The sale covers about 120 acres of land, and the present seam of coal is more than 8 feet in thickness. The Garfield and Vech mines have also been purchased, and arrangements have been completed with nearly all the operators in Southern Illinois for the sale of their mines. The second attempt to form this syndicate in St. Louis has proved successful, and articles of incorporation of the new organization have been filed. The incorporators are E. J. Crandall, A. F. Donk and Edward Devoey. The capital stock is placed at \$5,000,000, said to be held principally by St. Louis men, who are in the syndicate. The object of the corporation is self-protection, the independent operation of the interests in the past having proved unsatisfactory, and often unprofitable, for the reason that one company, with certain fixed charges, could not operate to its full capacity, for by so doing it would cut into the business of a competitor, and thus endanger the maintenance of peaceful relations.

ACCIDENTS.

James Sheetz, a miner, working at Packer colliery No. 3, near Shenandoah, Pa., was killed last week by a fall of coal.

Martin Mayby, who was in charge of the boring machine used in driving a tunnel at Stockton, Luzerne county, Pa., was instantly killed on Monday by being run over by a mine car.

On Tuesday last week John Cumiskey, a Hungarian laborer employed in the West End Coal Company's mines at Moccasin, Luzerne county, Pa., was instantly killed by a fall of top rock.

PERSONAL.

Hon. John F. Welsh, superintendent of the Swatara colliery, operated by the L. & B. C. & I. Co., has been transferred to Shamokin, Pa., where he takes a similar position under the company.

THE SALE VOID.

JERSEY CENTRAL MUST RETURN READING'S FIVE PER CENT. BONDS.

PHILADELPHIA, July 21.—Information was received here yesterday that the New Jersey Court of Appeals had reversed Chancellor Runyan's decision ordering that the \$3,000,000 of Reading bonds deposited with Receiver Little should be sold. This is regarded as a great victory for Mr. Gowen, who strenuously opposed the sale of the bonds to the end, contending that it was never intended the bonds should be sold. The court of last resort in New Jersey has sustained Mr. Gowen's position.

When the Reading leased the Central on May 21, 1883, there was a floating debt attached to the latter of \$2,062,000. The Chancellor of New Jersey made it a condition upon discharging the receiver that this floating debt should be paid. President Gowen agreed to guarantee that it should be paid, and offered to deposit bonds with Receiver Little as an earnest of his intention. Mr. Little accordingly received \$1,000,000 of first series 5 per cent. bonds and \$2,000,000 of second series, and he kept them in his possession until this Spring. In the mean-

time the inability of the Reading to pay the rental became manifest. Default followed default until the Jersey Central stockholders determined to regain possession of their property. The Chancellor decided that the terms of the lease had not been complied with, and that the road should be returned to its owners. At the same time he required that the floating debt, by this time reduced to \$1,405,000, should be paid.

The debt was being carried in New York on Jersey Central collateral. Receiver Little proposed to sell out the Reading bonds to pay the money, but Mr. Gowen protested, urging that the bonds were not given as security for the debt, but merely as indicating the purpose of the Reading to pay the debt if the Central was unable to do so. He contended that the Reading occupied the same position as the indorsers of a note, and should not be called upon to pay unless the principal was worthless.

The Chancellor did not adopt this view of the case, but ordered the bonds sold. Receiver Little complied and sold the \$1,000,000 of first series 5's in \$100,000 lots, realizing an average of 57.75 for them. Nearly every lot was bought in by Wharton Barker, of this city. There was also sold \$100,000 of the second series 5's at 25, but the lot was bid in by the Central Company and the balance was withdrawn. The bonds were delivered to Wharton Barker who now holds them.

Mr. Gowen always contended that the sale was illegal, and that the Central would have to return the bonds to the Reading whenever called for.

Mr. Barker said yesterday that the sale was regular, and that the Central could have the bonds back by paying par and interest for them.

THE COAL ALLOTMENT.

TWO AND A HALF MILLION TONS TO BE PRODUCED IN AUGUST.

PHILADELPHIA, July 21.—A meeting of the Allotment Committee of the Anthracite coal combination was held in this city yesterday to decide upon the production for August. Messrs. Harris, of the Lehigh Navigation Company; Potts, of the Lehigh and Wilkes-Barre, and Holden, of the Delaware, Lackawanna and Western, were present, as were also representatives of most of the other interests. After a consultation of more than an hour it was decided to recommend 2,500,000 tons as the quota for August. There was no particular opposition to this, as it was generally thought the market would take at least that quantity and probably more.

The allotment for August last year was 3,200,000 tons, and there were mined 3,025,000 tons, of which, however, 250,000 tons went into stocks at tidewater, leaving only 2,775,000 tons for outside consumption. This year, with 800,000 tons of coal on hand, it is proposed to mine 2,500,000 tons more, which will insure a large supply for the market. Some conservative producers hope that the quota would be put at 2,000,000, that an opportunity might be afforded of working off the accumulated surplus, but it was pretty well understood that their ideas could not meet with acceptance, as the large interests are going on the principle that 33,500,000 tons will be required this year.

READING FINANCES.

AN UNFAVORABLE SHOWING FOR THE MONTH OF JUNE.

PHILADELPHIA, July 20.—Special Master Geo. M. Dallas yesterday filed in the United States Circuit Court his audit of the account of the Receivers of the Philadelphia and Reading Railroad Company for the month of June. The railroad company's account shows a balance of \$137,618 34 carried over on the 1st of that month, to which are added the receipts from travel, freight and tolls on coal, merchandise, etc., amounting to \$2,275,188 76 and the various other receipts for the month, footing up together \$2,766,095 23. From this sum there is deducted \$174,677 70 for materials and supplies, \$1,012,260 98 for wages and salaries and the sundry disbursements, making a total altogether of \$2,649,431 72, and leaving a

balance of \$116,663 60 on the list of July.

The coal and iron company's account shows a balance carried over on the 1st of June of \$36,258 85 to which are added the receipts from coal sales, cash and bills receivable, \$1,094,743 86, and the receipts from other sources, giving a total of \$1,233,438 38. From this there is deducted \$188,307 97 for materials and supplies, \$709,500 87 for wages and salaries and the various other June outlays, summing up altogether \$1,291,511 25, and leaving a balance of \$192 13 on hand on the 1st of present month.

IN GOLDEN HONDURAS.

BUNCHES OF GRAPES WEIGHING FOUR POUNDS AND GROWING THREE CROPS A YEAR.

New Orleans Times-Democrat.

I saw in the garden of a private gentleman in San Pedro vines bearing a magnificent crop of grapes of delicious flavor, hanging in bunches weighing each from two to four pounds, and he informed me that he obtained from these vines three crops a year.

The timber resources of the country are practically unlimited, the valleys and slopes of the mountains abounding in mahogany, rosewood and many other valuable hard woods, and the higher regions covered with pine and cedar.

The mineral resources of the country are also wonderfully rich, but they must remain in their present state of imperfect development until roads are provided to reach them.

One American mining company has lately built eighty-five miles of road to the Pacific coast, and will doubtless be thus enabled to utilize some wonderfully rich property that they own.

I think that in the immediate future great changes will be made. If the various plans for the introduction of a banking system, the construction of railroads and other enterprises are carried out, as I believe they will be, the result must inevitably be a great movement of capital toward that country, as with proper facilities, I do believe there exists in the world today a country that will yield more satisfactory returns for judiciously invested capital.

THIRTEEN PETRIED MEN.

REMARKABLE DISCOVERY IN A CAVE AT AKRON, O.

INDIANAPOLIS, Ind., July 19.—A dispatch from Rochester says that while T. Bowman, residing about three miles north of Akron, was engaged in setting posts he was greatly surprised to see a post with which he was "packing" the bottom of the hole break through and disappear from sight. He took his spade and dug into the earth, which after a few minutes suddenly opened, disclosing a cave. He once descended by a ladder and a lantern and ascended into the cave. Here he beheld stretched on the ground the forms of twelve men, while the thirteenth leaned up against the side of the cavern, one hand outstretched as if earnestly addressing his twelve comrades. By the aid of his lantern Mr. Bowman examined the bodies and found them to be petrified. He soon made his exit and spread the news, and up to the present time hundreds of persons have visited the spot. All pronounced the scene the most wonderful and unaccountable ever witnessed.

Mr. Bowman is placing a stairway into the cave which is to be kept lighted, and it is his attention to charge for admittance. The cave is about 20 feet square and about 9 feet deep. Much speculation is being engaged in about the strange discovery and excitement is running high in the neighborhood of Akron.

Anarchists Sentenced.

MILWAUKEE, July 20.—In pronouncing sentence upon Frank Hirth, Carl Simon and Anton Palm, Anarchists, convicted of conspiring to burn the court house and of inciting people to deeds of violence, Judge Sloan said that time would decide as to whether they were visionary cranks, who liked to hear themselves talk, or real Anarchists, like the Chicago crowd. However, as judge, jury and witnesses had been threatened by their friends he would not exercise the clemency, and sentenced them nine months.

Philadelphia.

Ledger: The past week has developed much of interest to the Anthracite coal trade. The meeting of the representatives of the several Anthracite companies held in this city last Tuesday, to agree upon the quota of production for August, was looked forward to with great expectations. It was feared in some quarters that a greater output than that fixed upon—2,500,000 tons—might possibly be ordered, and in such event disastrous results would ensue. Anthracite would ensue. These fears have, however, been dispelled by unity of action on the part of the combined companies in agreeing not to produce any more coal in the month of August than the unsatisfactory condition of the trade, resulting from overproduction and prices so low that a number of the most valuable mines worked by conservative operators were compelled to "shut down," would warrant. The proposed output of Anthracite for August, 1885, was 3,250,000 tons, but the market requirements falling short of the anticipated necessities, only 3,025,900 tons were actually produced. And so it will likely be with next month's production if the same conditions of manufacturing industries do not necessitate the output of so great a quantity of coal as that agreed upon. It must be understood that the increasing demand for furnace and other manufacturing sizes of Anthracite necessitates a proportionate production of the domestic sizes, and, the demand for them having been very light for several months past, the cutting of prices was resorted to in order to induce sales and relieve the tide-water shipping points of some of the accumulated stocks of coal. The fixing of the August quota was immediately followed by the announcement that a conference of the managers of the coal companies was held on Thursday in New York, all except the Pennsylvania Railroad Company being represented. The representatives were reported as unanimously in favor of advancing prices, and a resolution was passed, without a dissenting vote, ordering the price of stove coal free on board in New York harbor to be advanced to \$3.50 per ton, and grate, egg and chestnut to \$3.15, the advance to take effect immediately. This advance in prices, we are informed, is not a "paper advance," but a "restoration" of the actual selling prices to about the figures ruling before the last cut was made by the New York companies. There has been much discussion since the announcing of the advance as to the wisdom of putting up the prices for coal until the markets have been relieved of some of the surplus stocks. Some of those best informed on Anthracite affairs are of the opinion that it was a foolish action and cannot be maintained; others, however, who stand equally as high in their knowledge of coal matters and who are equally as conservative, are of the contrary opinion. Time only can prove the wisdom or unwisdom of the action taken. After careful inquiry in coal trade circles we can say that the fixing upon so small a quota as 2,500,000 tons for August, and a belief in the sincerity of the representatives of the New York coal companies in restoring the actual selling prices instead of advancing the circular figures, has imparted an improved feeling amongst coal dealers and operators.

It will be noticed upon an examination of the figures given below that the production for this year to July 17th is only 1,484,747 tons ahead of the output last year to the corresponding date, while a few weeks ago the increased production was over 2,000,000 tons. The Reading Company's stock of coal at Port Richmond continues to gradually increase, and on Saturday had reached nearly 103,000 tons.

The total amount of Anthracite coal sent to market for the week ending July 17th, as reported by the several carrying companies, was 648,965 tons, compared with 705,173 tons for the corresponding week last year, a decrease of 86,302 tons. The total amount of Anthracite mined thus far in the year 1886 is 15,931,879 tons, compared with 14,147,132 tons for the same period last year, an increase of 1,484,747 tons. The following statement gives the gross tonnage of each of the leading coal carrying companies for the week ending July 17th, and for the year to same date, compared with the respective amounts carried to the same date last year:

Week	1886	1885	Difference
Reading & R.	285,836	7,507,327	6,955,461
Lehigh Valley	138,107	5,831,478	3,400,438
D. L. and Western	108,774	2,619,213	2,182,409
Shamokin	13,887	459,322	492,630
Und. R. R. N. Y.	38,004	850,296	877,039
Penn. Coal	31,926	704,631	645,979
Del and Hudson	76,642	2,124,197	1,893,457
Pa. and N. Y.	44,870	1,063,100	1,051,401
Cleaveland P.	52,820	1,052,173	1,012,417
Hun and B. Top	14,551	356,757	336,911
Nor. and W.	16,708	432,367	297,931

The Pennsylvania Railroad reports that the quantity of coal and coke carried over its lines for the week ending July 17th was 306,662 tons, of which 230,378 tons were coal and 76,286 tons coke. Of this weekly tonnage 217,039 tons originated on the main line of the Pennsylvania Railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 7,930,239 tons, of which 6,147,020 tons were coal and 1,783,219 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading Railroad reports that its coal shipment for last week, ending July 24th, was 288,000 tons, of which 38,700 tons were sent to and 30,900 tons shipped from Port Richmond, and 37,000 tons shipped from Port Richmond, and 37,000 tons were sent to and 35,000 tons shipped from Elizabethport.

Vessels are in plentiful supply at Port Richmond, and freights are quoted at \$1.65 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 85c./90c. and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending July 17 were 73,516 tons, and for the year to that date 961,031 tons, a decrease of 478,773 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio Railroad and local points—Week, 56,936 tons; year, 762,579 tons; decrease, 230,795 tons. To Pennsylvania Railroad—Week, 4823 tons; decrease, 84,278 tons. To Chesapeake and Ohio Canal—Week, 11,757 tons; year, 59,977 tons; decrease, 103,700 tons.

New Fire-Damp Indicator.

At a recent meeting of the Physical Society, London, the following, by Messrs. Walter Emmott and William Ackroyd, was read: "The Royal Commission on Accidents in Mines point out in their recently issued report, as a serious objection to the use of the electric light in mines, notwithstanding its many great advantages, that the light of an incandescent lamp, being produced within a vacuum, cannot admit of any device for the indication of fire-damp, such as is given by the Davy, for example. The present apparatus is the outcome of an attempt to overcome this difficulty. It consists of two incandescent lamps, one with colorless and the other with red glass, and the circuit is so arranged that in an ordinary atmosphere the colorless lamp alone shines, but in fire-damp this goes out and the red one is illuminated. This is effected in a simple manner by the motion of a mercury contact occupying the lower part of a curved tube, one end of which is open and the other connected with a porous pot of unglazed porcelain, the motion of the mercury being due to the increased pressure in the porous pot occasioned by diffusion.

Earthquake Waves.

The chief effect of an earthquake on the ocean is the raising of a great sea wave, sometimes very large, e. g., 60 feet high at Lisbon (1761), 80 feet at Callao (1724), 210 feet at Lupatka (1737). These waves are often more destructive on land than the actual shocks; the influx is usually preceded by an outflow, which, in fact, acts as a warning. One of the most remarkable effects is the distance to which these waves are propagated as "great waves," e. g., right across the Pacific. This most large earthquake on the east or west coast of the Pacific produces waves which are recorded on the opposite coast about twenty-four hours after.

As to the prediction of earthquakes, nothing certain is yet known. In many cases there are noticeable changes in springs and wells preceding earthquakes. One useful warning is, however, obviously possible, viz., the report of an actual earthquake on one side of the Pacific could be at once telegraphed to the other side, thus giving twenty-four hours' warning of the probable advent of a great sea wave.

Value of the Electric Light.

The passage of the Suez Canal, which until recently occupied from thirty-six to forty-eight hours, can now be made in sixteen hours for vessels fitted with the electric light apparatus. This important advance is the result of a very interesting report by Commander Hector, of the steamer Carthage, belonging to the Peninsular and Oriental company, and addressed to the directors. This report was written after the Carthage made the first continuous passage, under the authorization of the Canal company, given the 1st of December, 1885. The Carthage arrived at Suez after a run from Port Said of eighteen hours. The actual running time was sixteen hours, there having been two delays caused by impediments in the channel; the mean speed made was 5.43 miles per hour.

Here is the result of success done up in a small parcel: Look most to your spending. No matter what come in, if more goes out you will be poor always. The art does not consist in making money but in keeping it. Little expenses, like mice in a barn, when they are many make great waste. Hair by hair the head gets bald; straw by straw the thatch gets off the cottage; drop by drop the rain comes into the chamber. A barrel is soon empty if the tap leaks but a drop a minute. When you mean to save begin with your mouth; there are many thieves down the red lane. The ale-jug is a great waste. In all things keep within compass. In clothes choose suitable and last of stout and tawdry fancies. To be warm is the main thing. Never stretch your legs further than the blanket will reach, or you will soon be cold. A fool may make money, but it needs a wise man to spend it. Remember, it is easier to build two chimneys than to keep one going. If you give all to back and board there is nothing left for the savings bank. Fare hard and work while you are young, and you will have a chance to rest when you are old.—*Berwick Gazette.*

Adolf Laloz, carriage manufacturer, 119 Carroll street, Buffalo, N. Y., states: "I was troubled with nausea of the stomach, sick headache and general debility. Burdock Blood Bitters cured me."

A Lesson in Political Economy.

The phrase "political economy" sounds like something immensely learned, and it has been enveloped in a dense fog. Political economy, according to the Greek, is the science of city housekeeping. In ancient times a city the size of Boston would be a good-sized nation, and the term has expanded to national affairs, and now it has come to be applied to the whole matter of availability in exchange, an availability that means not what a thing is worth to you, or how much labor has been expended upon it, but what will any one give for it. Indeed, the basis of the science is the difference between the man and the animal. The animal finds the material which it needs in a state ready for use. Man must prepare his for use. Man, for instance, must get the fur from the animal, the cotton from the plant, the wool from the sheep, and still be chilly with cold just like the animal. Labor is effort put forth for the transformation of raw material into a shape fit for use. As man cannot prepare all the things necessary for his use, so the necessity exists for an exchange of labor. Another reason for the universal business of mankind. Every one of us wants to dodge all the work he can. Many a man would have gone to ruin if it had not been for starvation. We are all willing to drive a sharp bargain when we can get a chance. The factor of beneficence is almost universally ignored, but once in a while we do meet instances where a man is willing to do something for you without a return, and this factor does not affect prices. Man's labor is the great pacific ocean into which all mankind has been pouring its labor, and each of us takes from it the little painful of labor which we want to use. Labor is in a fluid state, as it were. But some States in our Union have made an exchange of labor. Another reason for the universal business of mankind. Every one of us wants to dodge all the work he can. 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A Double Broadway.

Broadway is the principal thoroughfare of New York City, and it is undoubtedly the longest street in the world, for it continues up the whole length of New York State and into Canada. It is practically the principal street of all the cities and towns which lie north of the metropolis. But this wonderful thoroughfare is to be the subject of an experiment which will attract to it the attention of all who reside in great cities. The State Legislature has authorized a company to create a second Broadway extending the whole length of Manhattan Island. Eighteen feet below the surface there is practically to be a new street extending from curb to curb, in which shall be transacted business as in any other street. It is expected that stores will be opened and traffic carried on as above ground, for it will be light in the daytime, but it will be more brilliant at night from electric illumination. On this lower street will be steam cars, not only for the accommodation of local travel, but which will connect with the railway system of the country. The traveler from New Orleans, Chicago, San Francisco, even the City of Mexico, will be able to buy his ticket and check his baggage direct to the hotel, if his destination be the metropolis. New York is built on a narrow island. Many of its new buildings are great tall structures, eight and ten stories high, and the city has become crowded; hence the necessity for doubling Broadway, and at the present rate of progress it may be that during the twentieth century a number of the other leading thoroughfares may be duplicated in the same way.

Steam Gauges Not Infallible.

Attention has been repeatedly directed, says the *Iron Age*, to the circumstance that steam gauges for boilers are not infallible, and that occasional comparison of their readings with those of standard and presumably accurate gauges is much to be recommended. Recent complaints among boiler owners in Germany have given further prominence to the matter, and have pointed also to the important fact, generally overlooked, that the standard gauges themselves are not above suspicion. It was found that in many cases the test gauges used in the official boiler inspections did not furnish the same readings as perfectly good gauges of the kind to be used in everyday work, even when both sets of the apparatus came from the same maker, and the most natural inference to be drawn was that the repeated high pressure to which these so-called standard gauges had been subjected had seriously impaired their proper working. Mercury gauges, we are led to believe, are not generally at the disposal of the German boiler inspector, and boiler owners must therefore be satisfied with the indications of the test gauges with which he is supplied. Testing the accuracy of these standard devices seems to be, incredible, though it sounds, an unusual thing, and steam users are perfectly to have every reason to be rightly indignant at the existing state of the testing service.

Pittsburg.

From the American Manufacturer

The frequent rains have swelled the Ohio enough to permit the return of a number of empty vessels, but not enough to allow of sending out loaded craft. Along the Monongahela everything is about as usual last week, there being only a very few mines in operation, chiefly owing to the glutted condition of the markets. At the railway mines there is a very fair degree of activity, the chief cause of complaint being the lowness of prices.

We quote same as last week:

PRICES AT PITTSBURG.

River, wholesale, on board.....3½/4½ cts. per bushel.
Railroad.....4½/4½ cts. per bushel.

AT CINCINNATI.

River, wholesale, on board.....56 cts. per bushel.

AT LOUISVILLE.

River, wholesale, on board.....56½ cts. per bushel.

AT NEW ORLEANS.

River, wholesale, on board.....25/26½ cts. per bbl.

Bushels are rated among dealers here at 76 lb.—26½ bushels make a ton of 2000 lbs., approximately.

The barrel that rules the coal measurement in New Orleans contains 2-47 bushels of 80 lbs. each, making about 200 lb. Nine and two-thirds of these barrels weigh a ton, with a small fraction.

Connellsville Coke—There are no changes to report. The ovens are all in operation full time, and the prices for next month will be the same as for this, namely: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Chicago.

From the Industrial World.

Though still somewhat dull, the local trade may be said to be picking up slightly. More coal is being moved than at the first of the month. This movement, however, is mostly in comparatively small quantities, and in all cases is for immediate delivery. Sellers are not disposed to make figures for future delivery, as it is quite generally believed among them that there will be an advance in price with the incoming month. Considerably more inquiry from the country is coming in, and fair average sales are being consummated. Values are steady, at old quotations, and exhibit, perhaps, a little less tendency towards cutting of rates. Lake freights from Buffalo are quiet and steady at 60 cents, with little

ready tonnage offered, and that easily disposed of. In Anthracite a little greater demand is noted, the bulk of which comes from outside buyers. This city trade is much quiet, and nearly all sales are for immediate consumption. Prices remain practically undisturbed, though it is quite generally rumored that at no distant day there will be a general advance. The figures may be shaded from 20/30 cents below card rates.

Bituminous coals are coming in only as needed, and, outside of occasional round sales, the trade assumes a retail nature. We can give no change in prices.

The call for coke remains good, with values inclined to be a trifle firmer.

Charcoal presents no specially new feature, and is in moderate request only.

In canal coal we hear of no important sales, prices remaining at old figures.

The current quotations are given as follows:

ANTHRACITE.

	Per gross ton by carload, 2240 lbs.	
Grate.....	\$ 5 60	
Egg.....	5 60	
Stove.....	5 88	
Nut.....	5 88	
Lehigh Lump.....	7 00	
	Per net ton by carload.	
Grate.....	\$ 5 00	
Egg.....	5 00	
Stove.....	5 25	
Nut.....	5 25	
Le. & S.....	6 20	
Nut.....	5 25	

BITUMINOUS.

Erie & Briarhill.....	\$4 15
Pittsburg.....	3 20
Indiana Block.....	2 40/2 50
" Slack.....	1 35/1 35
" Nut.....	1 65/1 80
Baltimore & Ohio.....	2 75/2 90
Hocking Valley.....	2 75/2 90
Youghiogheny.....	2 75/2 90
Wilmingon.....	2 10
Blossburg.....	3 25
Cumberland Smelting.....	3 25
Somman Smelting.....	3 40
Grape Creek.....	2 00
Fountain County.....	2 20
Clinton Lump.....	2 00
Streator.....	2 00
Minook.....	2 00
Morris.....	2 00

CANNEL.

Kanawha.....	4 50
Buckeye.....	4 25

COKE.

Connellsville Coke.....	5 00
Crushed Coke.....	5 50
Charcoal, carload per bu.....	8½/8½

Ohio Mining Law.

(Continued from page 264.)

TO PREVENT INTIMIDATION OF WORKMEN IN THE EXERCISE OF ELECTIVE FRANCHISE.

SEC. 7065. Whoever, not being a candidate for office, disburse or gives, or promises to give, any money, or other thing of value, or gives or treats to any spirituous, malt, or other liquors, directly or indirectly, to influence an elector in giving or withholding his vote, or with intent to induce him to vote contrary to his inclinations, seeks by violence, threats of violence, or threats to enforce the payment of a debt, or to begin a criminal prosecution, or to injure the business or trade of an elector, or if an employer of laborers, or an agent of such employer, threatens to withhold or reduce the wages of, or dismiss from service, any laborer in his employ, or refuses to allow any such employee time to attend at the place of election and vote, or whoever sells or offers to sell his influence with electors for a valuable consideration, or, with or by means of any thing of value, seeks to influence the vote of an elector, or to influence him to vote, or to refrain from voting, shall be fined not more than two thousand nor less than one hundred dollars, or imprisoned in the penitentiary not more than three years.

SCHOOL LAWS—ATTENDANCE ENFORCED.

SEC. 4023. Every parent, guardian, or other person having charge or control of any child between the ages of eight and fourteen years, shall be required to send such child to a common school for at least twelve weeks in each school year, at least six weeks of which shall be consecutive, unless the board of education, or the board of directors, as the case may be, having control of the school district or sub-district in which such parent or guardian resides, excuse such child from attendance, when it appears to the satisfaction of such board that the child's bodily or mental condition is such as to prevent its attendance at school, or application to study, for the time required, or that its time and labor are essentially necessary for the support of an indigent parent, brother, or sister, or that it is being otherwise furnished with the means of education for a like period of time, or has already acquired branches of learning ordinarily taught in common schools; but if the common school of the district or sub-district in which such parent or guardian resides is distant two miles from his residence by the nearest traveled road, he shall not be liable to the provisions of this section, and the subsequent sections of this chapter.

SEC. 4024. No manufacturer, owner of mills or mines, agent, overseer, contractor, landlord, or other person, shall employ any child under fourteen years of age during the established school hours of the locality, who has resided in this State during the school year next preceding the commencement of such employment, and is under the control of a parent or guardian, and is not dependent upon its own resources for support, unless such child has attended some common or private school for the term of at least twelve weeks during the school year next

preceding the commencement of such employment, and delivers to its employer a certificate of that fact from the clerk of a board of education, or a clerk of a board of directors, or the teacher of the school which it attended; nor shall such employment continue for a longer period than forty weeks during any school year from the time this act takes effect, unless such child deliver to such employer a certificate of excuse from the proper authority, for any of the reasons mentioned in the preceding section.

SEC. 4025. Each board of education shall ascertain, on the second Monday of February and the second Monday of September, or within fifteen days thereafter, each year, in such manner as it may deem most expedient, the condition of all children under fourteen years of age within its jurisdiction employed at any daily labor, or who are not in attendance at any common or private school, and shall report all violations of this chapter to its clerk, who shall at once proceed to prosecute each and every such offense.

SEC. 4026. If it be shown to the satisfaction of the board of education that the parent or guardian has not the means wherewith to purchase for his child or children the necessary school-books to enable him to comply with the requirements of this chapter, the board may furnish the same, free of charge, to be paid for out of the contingent fund at the disposal of the board.

SEC. 4027. A parent, guardian, or other person, who fails to comply with the provisions of this chapter, shall be liable to a fine of not less than two nor more than five dollars for the first offense, nor less than five nor more than ten dollars for each subsequent offense; such fine shall be collected by the clerk of the board of education, in the name of the State, in an action before any court having competent jurisdiction; and the money so collected by each clerk shall be paid to the county treasurer, and be applied to the use of the common schools of his district.

SEC. 4028. The clerk of the board of education shall prosecute every offense against the provisions of this chapter, when a member of the board of education, or any tax-payer of the district in which the offending parties reside, files with him an affidavit setting forth the facts which constitute the offense; and if he neglect to do so within fifteen days after such affidavit is filed, he shall be liable to a fine of not less than ten nor more than twenty dollars for each case of such neglect, to be assessed in the name of the State, in an action before any court of competent jurisdiction, by any person feeling aggrieved thereby.

SEC. 4029. Two weeks' attendance at half time or night school shall be considered, within the meaning of this chapter, equivalent to an attendance of one week at a day school.

WORKINGMEN'S LIENS.

(Laws of Ohio, vol. 80, page 183.)

SEC. 3206a. Laborers and employes of any person, association of persons or corporation, whether such employment be at agriculture, mining, manufacture or other manual labor, shall have a lien upon the real property of their employers for their wages, which is hereby declared to be superior to the following liens taken or attaching during the existence of such unpaid labor claims, to-wit: liens of attachment, liens of mortgage given or taken at a time of actual insolvency of the debtor, or with a view of preferring creditors, and all liens of pre-existing debt, and all superior to all claims for home-stead, or other exemptions, except under Section fifty-four hundred and thirty; and in all cases where property of an employer is placed in the hands of an assignee, receiver or trustee, claims due for labor performed within the period of three months prior to the time such assignee, receiver or trustee is appointed, shall be first paid out of the trust fund, in preference to all other claims against such employer, except claims for taxes and the costs of administering the trust. The lien herein provided shall be deemed to be waived by the laborer or employe, as to any portion of such labor, unless within thirty days from the expiration of three months from the performance of such portion, he shall file with the recorder of the county, where the labor was performed, an itemized statement verified by affidavit, of the amount, kind and value of the labor performed within said period, with all credits and offsets, and the amount then due him therefor, which verified statement, when so filed, shall be recorded in a book kept for the purpose, and shall become and operate as a lien upon the real property of the employer without any specific description thereof for the period of one year from and after the filing thereof, and if an action is brought to enforce the lien within that time, it shall continue in force until finally adjudicated; and the proceedings to enforce such lien shall be the same as in other cases of lien, against the owner of the property and all other persons interested; provided, that if several persons have or obtained liens under the provisions of this Section, against the property of the same employer, they shall have no priority among themselves, but all shall be paid pro rata, nor shall they have priority over those obtaining liens under Sections thirty-one hundred and eighty-four, thirty-one hundred and eighty-five, thirty-one hundred and eighty-six and thirty-one hundred and eighty-seven, shall have priority as provided therein.

(Continued on page 270.)

PRACTICAL AND THEORETICAL MINING.

QUESTIONS AND ANSWERS PREPARED WITH A VIEW
TO ASSIST APPLICANTS IN

Obtaining Certificates of Competency for the Positions
of Fire Boss, Mine Boss, Mine Inspector,
Etc., Etc., Etc.

BY ROBERT MAUCHLINE, EX-INSPECTOR OF MINES

Entered according to Act of Congress in the year 1885, by J. S. Kirkwood & Co., in the office of the Librarian of Congress, at Washington, D. C.

VENTILATION—BITUMINOUS.

Question 1.—If a mine employed 500 persons inside, and the air is split into two equal currents, what size would the airways have to be to pass the least quantity of air required by law, the velocity being 4 feet per second, the colliery located in the Bituminous region of Pennsylvania.

Ans.—The law requires 100 cubic feet per minute for each person.

$$\frac{100 \times 500}{2} = 25,000.$$

$$\frac{25,000}{60 \times 4} = 104.16,$$

$$\sqrt{104.16} = 10.2.$$

The airways if square would be 10.2 × 10.2 feet.

Ques. 2.—Two airways have each an area of 64 square feet and their lengths are each 3,000 feet, one circular the other square, is there any difference in their rubbing surface, if so, how much?

Ans.—Square airway rubbing surface

$$4 \times 8 \times 3,000 = 96,000.$$

Circular airway

$$\sqrt{\frac{64}{.7854}} \times 3.1416 \times 3,000 = 8471.7$$

Difference of surface 11288.3 feet.

Ques. 3.—If you have two airways equal in dimensions, one 900 and the other 1,600 feet long, passing a total volume of 25,000 cubic feet per minute, how much passes along each, both being separate splits from the same point?

Ans.—The quantity passing is inversely as the square root of the length. Because the area and perimeter is equal in both, their lengths are as 9 is to 16.

$$\sqrt{9} + \sqrt{16} = 3 + 4 = 7;$$

then the sum of their square roots is inversely to the square root of each as the total volume is to the volume in each respectively.

7.4:25,000: 10714.7 quantity passing in long airway.
7.3:25,000: 14285.3 " " "short " "

Total 25,000 as before.

Changing the pressure with a constant rubbing surface or changing the rubbing surface with a constant pressure, has the same effect on the quantity passing, the quantity changing as the square root in both cases where the area and perimeters are equal.

Ques. 4.—If two airways are the same length and area, the one square and the other circular, with a total quantity of 30,000 cubic feet passing, what is the quantity passing in each.

Ans.—In this question the perimeter and length not being given, we have only the relation between the circumference of a circle and the perimeter of a square of equal area from which to proportion the rubbing surface. The circumference of a circle whose diameter is 1 has a rubbing surface of 3.1416. The side of a square which is equal to a circle is .8662 of the diameter; therefore, the perimeter is

$$4 \times .8662 = 3.4648,$$

these being proportional to the rubbing surfaces, their square roots are inversely proportional to the quantities passing.

$$\sqrt{3.1416} = 1.7724$$

$$\sqrt{3.4648} = 1.8827$$

Sum 3.6551

Then 3.6551 : 1.7724 :: 30,000 : 14547.7
3.6551 : 1.8827 :: 30,000 : 15452.7

Total passing 30000.4 as before.

Question 5.—With natural ventilation can you ensure a regular air current, if so, state fully your reasons. With a difference of depth of 40 feet in two shafts (ventilated by natural means) and also a difference of temperature of 40° between the inside and outside of a mine, show which shaft would be the upcast, supposing the outside temperature was highest and give reasons why.

Ans.—Natural ventilation depends on the difference of level between the openings of the mine, and the difference of temperature between the air inside

and outside. The difference of height does not change but the difference of temperature does. When the air outside and inside are equal there is no pressure to produce a current; therefore, natural ventilation will not insure a regular current. With a difference of 40 feet between the level of the openings and a difference of 40°, the motive column would be equal to

$$40 \times \frac{40}{459} = 3.48 \text{ feet.}$$

The weight of 3½ cubic feet of air would not produce any perceptible effect in moving air through a mine, although, theoretically, the air will move into the mine by the highest shaft when the outside air is the hottest, because the air is condensed in the mine when it is the coldest and flows out by the lower opening. When the inside temperature is highest this is reversed, the cold outside air flowing in at the lowest opening. When both temperatures are equal, there is no ventilation.

VENTILATION.

Question 1.—If there are two airways from the bottom of a shaft the full height of a 6 foot seam and 8 feet wide, the one 300 and the other 1,200 yards long. To cause the long airway to pass the same quantity as the short one, how much must be taken off the side to widen it?

Ans.—Two airways commencing at a shaft are separate splits, and therefore subject to equal pressure. Their lengths are as 1 is to 4 and also their rubbing surfaces. The height of the airway is 6 feet, therefore every foot taken from the side increases the area 6 feet and adds 6 feet to the total pressure, while it only adds 2 feet to the rubbing surface or perimeter. The difference in the resistance of the two airways is according to the square root of the length or surfaces. Increasing the area of the long airway will lower the velocity and increase the total pressure in a much greater ratio than the increase of the rubbing surface; therefore, the long airway can be made as wide as to bring its resistance equal to the short one.

Let us increase the area in proportion to the square root of the respective rubbing surfaces.

$$\sqrt{1} : \sqrt{4} :: 48 : 96$$

as the area to which the long airway should be increased. Its height is 6 feet, therefore its width would have to be 96 ÷ 6 = 16 feet. The long airway would require 8 feet taken off the side and be widened to 16 feet or the double. This would make the perimeter of the long airway 2 × 16 + 2 × 6 = 44 feet, and 44 × 3,600 = 158,400 = rubbing surface. The perimeter of the short airway is 2 × 6 + 2 × 8 = 28, and its length is 900, and 900 × 28 = 25,200 rubbing surface.

$$\frac{158,400}{25,200} = 6.2858;$$

therefore their surfaces are now to each other as 1 is to 6.2858. The areas are also as 1 is to 2.

Airways under equal pressure pass quantities in proportion to

$$\sqrt{\frac{a}{s}} \times a$$

If we apply this formula to both, the results should be equal as they are to pass equal quantities.

Long airway

$$\sqrt{\frac{2}{6.2858}} \times 2 = 1.12.$$

Short airway

$$\sqrt{\frac{1}{1}} \times 1 = 1$$

This shows that the area has been made too large as it would pass 12 per cent more air. This is near enough for all purposes, but the small difference is due to the increase of rubbing surface only increasing the resistance as the square root, while the reduction of velocity decreases the resistance as the square, and the total pressure increases as the area is increased, which would be a compound proportion.

Question 2.—If there is a difference of pressure equal to 3 pounds per square foot, between a downcast and upcast shaft, with a volume of 24,000 cubic feet of air passing per minute, what would be the difference of pressure with a volume of 48,000 cubic feet passing, other things being equal?

Ans.—The volume varies as the velocity and the pressure as its square. In this question the volume is doubled, and of course, twice the velocity requires 4 times the pressure, therefore, the 3 pounds per foot requires to be increased to

$$3 \times 4 = 12 \text{ pounds,}$$

a difference of 9 pounds per square foot.

The power expended for 24,000 cubic feet is

$$\frac{24,000 \times 3}{33,000} = 2.18 \text{ H. P.}$$

The power expended for 48,000 cubic feet is

$$\frac{48,000 \times 12}{33,000} = 17.45 \text{ H. P.}$$

$$\frac{17.45}{2.18} = 8.01;$$

therefore, the double volume requires 8 times the power.

In this proportion the quantity of air is doubled; therefore, twice the velocity requires

$2^2 \times 3 = 12$ or the square of the pressure, and $2^3 \times 2.18 = 17.41$ horse power the cube of the

power, which proves that the volume of air passing in a mine varies as the square of the pressure and the cube of the power.

Ques. 3.—If an expenditure of 5 horse power moves a current of 30,000 cubic feet per minute through a mine, what power will be required to move a current of 60,000 cubic feet per minute?

Ans.—The volume varies as the cube of the power, 60,000 is 3 times 30,000; therefore, three times the air would be required.

$$3^3 = 27; 27 \times 5 = 135 \text{ horse power,}$$

three times the air requiring the power to be raised from 5 to 135 H. P. This shows that it is impracticable to obtain 3 times or even twice the air at our collieries by merely increasing the speed of the fan, because they are not driven by engines of sufficient power.

Ques. 4.—With a difference of one-tenth ($\frac{1}{10}$) of an inch of mercury as indicated by the barometer between a downcast and upcast shaft, what would be the pressure per foot, and what would be the motive column, the thermometer of the downcast averaging 60°?

Ans.—A cubic inch of mercury weighs .4908 or nearly $\frac{1}{2}$ pound.

$$\frac{.4908 \times 141}{10} = 7.06752$$

pounds per square foot as the difference of pressure. Air at 60°, under 30 inches of mercury column, weighs .076063 pound per cubic foot.

$$\frac{7.06752}{.076063} = 92 \text{ feet,}$$

as the motive column.

(To be Continued.)

Safety of Nitro-Glycerine Explosives in the Presence of Fire-damp and Coal-dust.

A communication on the above subject was made by M. Hilt on the 9th September, 1885, to the Association of Mining Interests of the district of Aix-la-Chapelle, of which the following is a *resume*:

The experiments undertaken at Neunkirchen with reference to the employment of explosives having a base of nitro-glycerine in collieries have been brought to a conclusion. They have demonstrated that the new explosives, called *brisants*, present absolutely no danger in the presence of outbursts of coal-dust, and none even in the presence of fire-damp, on condition that they are not mechanically mixed with neutral powders, that the tamping is neutral, and that the capsule is sufficiently strong to produce the complete explosion of the cartridge. Gun-cotton, gum-gelatin and kineticite have been demonstrated to be harmless in gaseous mixtures in which there is up to 10 per cent. of fire-damp and coal-dust. Experiments have been made with dynamite, kieselguhr and gelatine-dynamite. With regard to the first, great differences have been observed between the strong and weak qualities. It may be concluded from the voluminous correspondence which has been carried on on this subject with all the principal manufacturers, that these qualities proceed from the external constitution of the dynamite and not from the quantity of nitro-glycerine contained. For the same quantity the differences in the effects produced would be explained solely by the variation of quality of the kieselguhr itself.

Up to the present, manufacturers have considered weak dynamite as the best, because it does not explode so easily as the strong. But strong dynamite, according to the experiments which have been made, does not communicate its inflammable nature so easily as weak. The former has never set fire to a gaseous mixture in which there was less than 7 per cent. of fire-damp, not even in cases where the cartridge was placed freely on the ground in the midst of discharges of coal-dust. Much more is it without danger in a borehole unless it is absolutely surcharged, in which case a mixture of 7 per cent. of fire-damp would be able to be ignited. The cartridge of weak dynamite placed freely on the ground ignites gas, on the contrary, at 4½ per cent. and over, while in a borehole it is inoffensive even with 5 and 6 per cent. of fire-damp. The danger of explosion seems, therefore, to depend on the more or less strong surcharge of the borehole. It is essential in every case that the capsule should be very strong.

With regard to dynamite Nos. 2 and 3 (mixtures of nitro-glycerine with nitrated cellulose, &c.), they are generally better than kieselguhr dynamite. They have never caused an explosion with 5 per cent. of fire-damp and coal-dust, whether they have been placed at the bottom of a borehole or placed freely on the floor of the gallery.

All the Neunkirchen experiments have been made with the greatest care. When a mine boring has not produced an ignition of the gas, it has been shown many a time, by means of a safety lamp, that after the explosion of the borehole, the gaseous mixture had the same composition as before. With regard to the gas which is given forth by means of the detonation of the explosive, it has been proved that that of gun-cotton was the least unpleasant. It would therefore follow that the preference must be given to gun-cotton, were it not for the following disadvantages which it presents, viz., that being composed of a very rigid substance, without plasticity, the cartridge can only be inserted in boreholes which are perfectly regular.—Translated from the *Moniteur Industriel*.



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-AT-

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FOR THE WEEK ENDING

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CROP AND BUSINESS PROSPECTS.

Corn is the only food crop which remains in serious doubt and the odds steadily mass in favor of a large yield. Kansas, one of the most important corn States in the Union, has had its drouth relieved by timely showers during the last week, and there is now every prospect of a crop of this cereal large enough to continue cheap food for another year. Wheat, it becomes more and more certain, will equal last year's supply, and the week's advices about foreign crops render improbable any large addition to the foreign demand. The English crop will probably pull up to a fair harvest, and the French deficiency in wheat of 23,000,000 bushels or so promises no large demand on this country. Supplies outside of the United States and Russia tell much the same story, and there is at present no prospect that the coming crop year will see any larger export of cereals than the last.

For the Atlantic coast this simply means that the coming year will see substantially unchanged the trade conditions of the past year, in which a large traffic has been carried on at very fair wages to labor, very favorable prices to the buyer and the smallest possible margin of profit to the capitalist. There is a strong impression abroad that the coming six months is to see the last change for the better. This may take place, but two facts work steadily against any increase in profits. One is the growth in imports as prices lessen abroad and manufacturers in England, Germany and France find themselves compelled to sell somehow in the United States. The result is a steady increase in merchandise imports relative to our exports. The totals in hundreds of millions of merchandise exports and imports for the last six fiscal years, ending with June, are as follows:

Exports.....	'80-1.	'81-2.	'82-3.	'83-4.	'84-5.	'85-6.
Imports.....	\$30,740	\$27,400	\$29,230	\$27,400	\$27,400	\$27,400
Imports.....	642	724	723	667	577	635

The difference here between the business done in the first year and the last is only too apparent. It is of even more serious consequence that, while in the case of exports both value and quantity are greatly reduced, the imports show a great increase in quantity, while the total value is little below the average of recent years. The practical result is that, while the value of our exports in 1855-6 is a much smaller reward than in 1880-1 for the labor expended and the capital employed in producing the cereals, provisions, cotton and petroleum exported, the imports now represent a much sharper competition with the labor and capital engaged in the production of like articles at home than six years ago. At the same time, the competition of the South and West with the manufactures of New England and the Middle States is steadily increasing. It is noticeable, for instance, that the demand made for a reclassification of domestic dry goods by the trunk line pool is based upon the fact that the competition of Western mills renders the high first-class freight rate a prohibitory tariff on the product of Eastern mills.

For the present the immediate record of trade shows no decided change, if we except the increasing activity reported in the iron trade at Pittsburg. The demand continues to increase and the present large production makes no impression on the market. Manufacturers are booking orders faster than at any time during the past four years, and the outlook for the Fall trade is most promising.

The coal trade remains in *statu quo*, the only transaction of importance in the trade, being the fixing of the allotment for August at 2,500,000 tons. Prices remain unchanged, although reports of cutting have been circulated; and the belief now is that the conservative output of August will reduce the stocks at tidewater sufficiently to warrant an advance next month.

REVOLUTIONARY INVENTIONS.

The American Machinist says while the crop of inventions that are to revolutionize some industry—with a capital of ten million dollars or so—is not coming forward so rapidly as usual this year, there is no reason to believe that there will not be the customary seed time and harvest. But there is some evidence that booming wild-cat schemes in the mechanical line will not be so profitable in the future as in the past. Not that people are likely to seriously object to being humbugged, but they like a variety in the process. Clairvoyants, so called, used to do a thriving business in dealing out instructions for finding buried treasure and the like, all for the sum of a dollar or two, but finally it began to occur to those who invested, that if the

"mediums" knew these things so well they were selling certainties to get rich at remarkably low figures.

When men have—on their own evidence—discovered revolutionary mechanical or engineering principles there is room for the same suspicion, if they propose to lead stockholders to positive riches for a few dollars. When such inventions, or discoveries, are made in these times there is little probability of immense capital being required to develop them, especially not to go to the extent of satisfactorily demonstrating their utility. We have in mind at this time three of these revolutionary schemes, all brought out within the past three years, now all dead beyond the possibility of resurrection. In each instance immense capital was being looked after—in one case at least twenty-five million dollars—sure to be returned a hundredfold almost immediately. As a matter of fact there were in the country a thousand manufacturers in the line of these alleged inventions, either of whom had sufficient capital to push them all they could have been pushed, and either of whom would have investigated the matter, and if a fraction of the value claimed had been found would have pushed it almost at the inventor's own terms.

When the first that is heard of an invention is through efforts to start a gigantic company, it is not generally worth further attention. There may be exceptions to this, but a glance at the meritorious things in the mechanical line that have been brought out will show that not many of them have been pushed by gigantic stock companies. The inevitable moral is to avoid assisting to push things in this way.

The 1st of July was a big day among the money kings. There fell due on that date and was payable in New York alone about \$65,000,000. Of this sum about \$18,000,000 was paid out by the National and State governments, \$35,000,000 on railroad bonds and stocks, and \$12,000,000 in dividends on canal, telegraph, express and bank stocks. So far during the present year the disbursements by railroad, express, telegraph and other companies were \$185,000,000, and \$70,000,000 more will be paid out before the close of the year, making a total of \$255,000,000. That sum does not include government or State interest or dividends by manufacturing companies.

The Bureau of Statistics reports the value of the exports of merchandise from the United States for the twelve months ending June 30, 1886, as \$679,452,972, and of imports for the same period as \$635,253,606, giving an excess of exports over imports for the year of \$44,172,366, and of exports over imports for the month of June of \$1,750,800. Imports exceeded exports for the six months ending June 30, however, by \$895,066. The exports of gold from the United States for the twelve months ending June 30, 1886, were \$42,952,191, and the imports for the same period amounted to \$20,731,501, giving an excess of exports of gold over imports of \$22,220,690.

The *Manufacturers' Gazette* says "a new locomotive, involving an outlay of say \$25,000, is turned out each month in the Consolidated Railroad shops at New Haven. Many master mechanics believe they can build better and cheaper locomotives than can be bought from regular locomotive shops. but at present prices of labor and materials wherever it costs \$25,000 a piece to build locomotives in a railroad shop we should say they had better stop new construction as soon as possible. At that rate of expense for anything required to run a road, the most prosperous railroads in the country would soon have receivers."

THERE will be another examination for mine bosses at Osceola, Clearfield county, Pa., beginning on Wednesday morning, August 4th.

Some remarkable cures of deafness are recorded of Dr. Thomas' Electric Oil. Never fails to cure ear-ache.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

(Continued from page 267.)

Sec. 3206b. The provisions of the foregoing Section shall apply to and include any laborer who indirectly performs labor for a general employer, or the results of whose labor is immediately enjoyed by a general employer whenever such general employer assumes payment of such laborer's wages, or the right to draw upon his books of account or otherwise, and when over the provisions of this section apply, all proceedings hereunder shall be the same as provided in the preceding section. But nothing in the foregoing section shall be so construed as to affect or impair any valid or subsisting lien existing at the time of the passage of this act.

AN ACT

To authorize the creation and to provide for the operation of tribunals of voluntary arbitration to adjust industrial disputes between employers and employed.

SECTION 1. Be it enacted by the General Assembly of the State of Ohio, That the Court of Common Pleas of each county, or a judge thereof in vacation, shall have the power, and upon the presentation of the petition, or of the agreement hereinafter named, it shall be the duty of said court, or a judge thereof in vacation, to issue in the form hereinafter named a license or authority for the establishment within and for each county of tribunals for voluntary arbitration and settlement of trade disputes between employers and employed in the manufacturing, mechanical, or mining industries.

Sec. 2. The said petition or agreement shall be substantially in the form hereafter given, and the petition shall be signed by at least forty persons employed as workmen and by four or more separate firms, individuals, or corporations within the county, or by at least four employers, each of whom shall employ at least ten workmen, or by the representative of a firm, corporation, or individual employing not less than forty men in their trade or industry; provided, that at the time the petition is presented, the judge before whom said petition is presented, may, upon motion, require testimony to be taken as to the representative character of said petitioners, and if it appears that the said petitioners do not represent the will of a majority, or at least one-half of each party to the dispute, the license for the establishment of the said tribunal may be denied, or may make such other order in this behalf, as to him shall seem fair on both sides.

Sec. 3. If the said petition shall be signed by the requisite number of both employers and workmen, and be in proper form and contain the names of the persons to compose the tribunal, being an equal number of employers and workmen, the judge shall forthwith cause to be issued a license substantially in the form hereinafter given, authorizing the existence of such tribunal and fixing the time and place of the first meeting thereof, and an entry of the license so granted shall be made upon the journal of the Court of Common Pleas of the county in which the petition originated.

Sec. 4. Said tribunal shall continue in existence for one year from the date of the license creating it, and may take jurisdiction of any dispute between employers and workmen in any mechanical, manufacturing, or mining industry or business, such shall have petitioned for the tribunal, or have been represented in the petition thereof, or who may submit their disputes in writing to such tribunal for decision. Vacancies occurring in the membership of the tribunal shall be filled by the judge or court that licensed said tribunal, from three names presented by the members of the tribunal remaining of that class in which the vacancies occur. The removal of any member to an adjoining county, shall not cause a vacancy in either the tribunal or the post of umpire. Disputes occurring in one county may be referred to a tribunal already existing in an adjoining county. The post of umpire in any of said tribunals and vacancies occurring in such place, shall only be filled by the mutual choice of the whole of the representatives, of both employers and workmen constituting the tribunal, immediately upon the organization of the same. The umpire shall be called upon to act after disagreement is manifested in the tribunal by failure during three meetings held and full discussion had. His award shall be final and conclusive upon such matters only as are submitted to him in writing and signed by the whole of the members of the tribunal, or by parties submitting the same.

Sec. 5. The said tribunal shall consist of not less than three employers or their representatives, and two workmen. The exact number which shall in each case constitute the tribunal, shall be inserted in the petition or agreement, and they shall be named in the license issued. The said tribunal when convened, shall be organized by the selection of one of their number as chairman and one as secretary, who shall be chosen by a majority of the members, or if such majority cannot be had after two votes, then by secret ballot, or by lot, as they prefer.

Sec. 6. The members of the tribunal shall receive no compensation for their services from the city or county, but the expenses of the tribunal, other than fuel, light, and the use of the room and furniture, may be paid by voluntary subscription, which the tribunal is authorized to receive and expend for such purposes. The sessions of said tribunal shall be held at the county seat of the county where the petition for the same was presented, and a room in the court house for the use of said tribunal, shall be provided by the county commissioners.

Sec. 7. When no umpire is acting, the chair-

man of the tribunal shall have power to administer oaths to all witnesses who may be produced, and a majority of said tribunal may provide for the examination and investigation of books, documents and accounts pertaining to the matters in hearing before the tribunal, and belonging to either party to the dispute; provided, that the tribunal may unanimously direct that instead of producing books, papers and accounts before the tribunal, an accountant agreed upon by the entire tribunal, may be appointed to examine such books, papers and accounts, and such accountant shall be sworn to well and truly examine such books, documents, and accounts, as may be presented to him, and to report the results of such examination in writing to said tribunal. Before such examination the information desired and required by the tribunal shall be plainly stated in writing and presented to said accountant, which statement shall be signed by the members of said tribunal, or by a majority of each class thereof. Attorneys at law or other agents of either party to the dispute, shall not be permitted to appear or take part in any of the proceedings of the tribunal, or before the umpire.

Sec. 8. When the umpire is acting he shall preside, and he shall have all the powers of the chairman of the tribunal; and his determination upon all questions of evidence, or other questions, in conducting the inquiries then pending, shall be final. Committees of the tribunal consisting of an equal number of each class may be constituted to examine into any question in dispute between employers and workmen which may have been referred to said committee by the tribunal, and such committee may hear and settle the same finally, when it can be done, by a unanimous vote; otherwise the same shall be reported to the full tribunal, and be there heard, as if the question had not been referred. The said tribunal, in connection with the umpire, shall have power to make, ordain, and enforce rules for the government of the body when in session, to enable the business to be proceeded with in order, and to fix its sessions and adjournments; but such rules shall not conflict with this statute, nor with any of the provisions of the constitution and laws of Ohio.

Sec. 9. Before the umpire shall proceed to act, the question or questions in dispute shall be plainly defined in writing, and signed by the members of the tribunal, or a majority thereof of each class, or by the parties submitting the same; and such writing shall contain in the submission of the decision thereof to the umpire by name, and shall provide that his decision thereon, after hearing, shall be final. The umpire shall be sworn to impartially decide all questions that may be submitted to him during his term of office. The submission and his award may be made in the form hereinafter given, and said umpire must make his award within ten days from the time the question or questions in dispute are submitted to him. Said award shall be made to the tribunal; and if the award is for a specific sum of money, said award may be made a matter of record by filing a copy thereof in the Court of Common Pleas of the county wherein the tribunal is in session. When so entered of record it shall be final and conclusive, and the proper court may, on motion of any one interested, enter judgment thereon; and when the award is for a specific sum of money, may issue final and other process to enforce the same.

Sec. 10. The form of the joint petition or agreement praying for a tribunal under this act shall be as follows:

To the Court of Common Pleas of.....County (or to a judge thereof, as the case may be):

The subscribers hereto, being the number and having the qualifications required in this proceeding, being desirous of establishing a tribunal of voluntary arbitration for the settlement of disputes in the.....(here name the branch of industry) trade, and having agreed upon A, B, C, D, and E, representing the employers, and G, H, I, J, and K, representing the workmen, as members of said tribunal, who each are qualified to act thereon, pray that a license for a tribunal in the.....trade may be issued to said persons named above.

Employers	Names	Residence	Works	No. Employes.
-----------	-------	-----------	-------	---------------

Employes.	Names	Residence	By whom Employed.
-----------	-------	-----------	-------------------

State of Ohio, } ss.
.....County, }

WHEREAS, The joint petition and agreement of four employers (or representatives of a firm, corporation, or individual, employing forty men, as the case may be), and forty workmen has been presented to this court (or if to a judge in vacation, so

stated), praying the creation of a tribunal of voluntary arbitration for the settlements of disputes in the.....trade within this county, and naming A, B, C, D, and E, representing the employers, and G, H, I, J, and K, representing the workmen. Now in pursuance of the statute for such case made and provided, said named persons are hereby licensed and authorized to be and exist as a tribunal of voluntary arbitration for the settlement of disputes between employers and workmen for the period of one year from this date, and they shall meet and organize on the.....day....., A. D., at

Signed, this.....day of....., A. D.
.....Clerk of the Court of Common Pleas of.....County.

Sec. 12. When the tribunal agrees to submit a matter in controversy to the umpire, it may be in form as follows:

We, A, B, C, D, and E, representing employers, and G, H, I, J, and K, representing workmen, composing a tribunal of voluntary arbitration, hereby submit and refer unto the umpirage of L (the umpire of the tribunal of the.....trade), the following subject matter, namely: [Here state fully and clearly the matter submitted.] And we hereby agree that his decision and determination upon the same shall be binding upon us, and final and conclusive upon the question thus submitted; and we pledge ourselves to abide by and carry out his decision of the umpire when made.

Witness our names this.....day of....., A. D. [Signatures.]

Sec. 13. The umpire shall make his award in writing to the tribunal, stating distinctly his decisions on the subject matter submitted. And when the award is for a specified sum of money, the umpire shall forward a copy of the same to the clerk of the proper court.

Sec. 14. This act shall be in force from and after its passage.

AN ACT

To provide against the payment of wages in scrip, orders, etc., and against selling goods or supplies to employees at excessive prices.

Sec. 7015. It shall be unlawful for any person, firm, company, or corporation, to sell, give, deliver, or in any manner issue, directly or indirectly, to any person employed by him or it, in payment of wages due for labor, or as advances on the wages of labor not due, any scrip, token, check, draft, order, or other evidence of indebtedness payable or redeemable otherwise than in money; any violation of the provisions of this section shall be punishable by a fine of not less than twenty-five, or more than one hundred dollars or imprisonment of not more than thirty days, or both; and the amount of any scrip, token, check, draft, order, or other evidence of indebtedness, sold, given, delivered, or in any manner issued, in violation of the provisions of this section, shall be recovered in money at the suit of any holder thereof, against the person, firm, company, or corporation selling, giving, delivering, or in any manner issuing the same; provided, that nothing in this section shall apply to any person, firm, company, or corporation employing less than twenty men; and provided further, that nothing in this section shall apply to, or affect the right of, any person or private individual from giving orders on any store or business house or firm in the business or profits of which he has no interest, directly or indirectly.

Sec. 7016. Whoever compels, or in any manner seeks to compel, or attempts to coerce an employee of any person, firm, or corporation to purchase goods or supplies from any particular person, firm, or corporation, shall be fined not more than one hundred nor less than twenty dollars, or imprisoned not more than sixty days, or both; and whoever sells goods or supplies of any kind, directly and indirectly, to his employee, or pays the wages of labor of his employee in goods or supplies of any kind, directly, through the intervention of scrip, order, or other evidence of indebtedness, at higher prices than the reasonable or current market value in cash of such goods or supplies, shall be liable to like punishment and penalties above specified, and shall, in addition thereto, be liable in civil action to the party aggrieved, in double the amount of any charges made for such goods or supplies in excess of the reasonable or current market value in cash, of such goods or supplies.

Sec. 7017. The prosecuting attorney of any county, upon complaint made to him of any violation of either of the two preceding sections within his county, shall cause such complaint to be investigated before the grand jury.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, July 24, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	46,110-05	1,118,127-14
Shipped South.....	31,650-10	1,578,804-17
Total.....	77,718-15	2,696,932-11
For corresponding time last year.		
Shipped North.....	55,920-04	1,086,865-05
Shipped South.....	54,142-04	1,235,606-08
Total.....	110,062-08	2,292,471-13
Increase.....		404,460-18
Decrease.....	31,343-13	

COAL MINING IN KANSAS.

Extracts From the Report of John R. Braidwood, State Inspector of Mines.

TO PREVENT PREMATURE EXPLOSIONS OF POWDER.

Since my appointment to this office, five victims have been caused much pain and suffering, as well as loss of valuable time, through injuries sustained by the premature explosion of charges of powder. A description of such accidents please find under the head of non-fatal accidents I and 11. In my short time in this office, no accidents of a fatal character from this cause have occurred; but it is only a question of time, it may be short or long, until fatal accidents will occur through this cause, if the iron drilling tools now in use are continued.

"Taking this view of the matter, I think "a stitch in time will save nine." I would suggest that a provision of law be passed prohibiting the use of iron or steel drilling and blasting tools in the mines in this State, and substituting for them copper tools, which will cost but a trifle more. Such a law has been in existence in the State of Illinois for several years, and not a single accident has occurred by premature explosions since the law came in force.

I have made some inquiries of the leading manufacturers of these tools in the State of Illinois as to their cost, and they say that they can furnish a copper needle and a copper tamp-end for \$2.50 per set. A copper needle, with ordinary care, will last a lifetime, while those made of iron or steel will only last a few years, and are generally rusty, and often roughen or case the needle-hole when they are withdrawn, and in consequence the miner has a squibbed shot. A copper needle will not rust, is easily withdrawn, and always leaves a clean, smooth needle-hole, and the miner has less squibbed shots. Of course when coal is wet, a blasting-barrel will have to be substituted for the needle, but at the same time the charge is stemmed with the copper tamp-end drill; so that there is, in a manner, no risk of an explosion with a blasting-barrel. The copper tamp-ends for tamping-bars, are fastened on to a piece of iron at the manufactory, so that it can be welded on to any drill or tamping-bar at the mines.

Accidents cost money, both to operators and employees, and I can safely say not one operator out of ten will ask his workmen more for these tools than they can purchase them for, until all their men have been supplied. I think the operators will be only too glad to get the safety tools introduced to prevent accidents, without asking an exorbitant price for them. The makers of these tools say that miners can club together and get the tools from them in one-dozen lots, at as low a figure as any dealer can. Nearly fifty per cent. of our coal is now being mined by the blasting process, and it is only a question of time until a larger percentage will be mined by this method, so that accidents are bound to increase from premature explosions, instead of diminishing, as long as the use of iron blasting-tools in our mines continues.

If a law prohibiting the use of iron tools would prevent accidents now, it would surely prevent more in the future. I think it is a wise plan to pass laws to prevent accidents when the cause is foreseen, and is more humane than to wait until more accidents have occurred, and then pass a law. Lives in full bloom can be saved, sometimes, by a little forethought, but lives lost cannot be recalled. If all the money and loss of time spent on injuries received by premature explosions were summed up in dollars and cents, I venture to say it would go quite a long way toward defraying the expenses of furnishing safety blasting-tools. If such a law were made, six months' time could be given every miner to furnish himself with a set, and it would also give the manufacturer time to make them.

The following is a copy of the section of the Illinois mining law, which refers to copper tools:

"Sec. 19. That all miners and employees engaged in mining coal shall use copper needles in preparing blasts in coal, and not less than five (5) inches of copper on the end of all iron or steel bars used for tamping blasts of powder in coal, and the use of iron needles and iron tamping-bars not tipped with five (5) inches of copper, is hereby declared to be unlawful. Any failure on the part of a coal miner or an employee in any coal mine to conform to the terms and requirements of this act, shall subject any miner or employee to a fine of not less than five dollars nor more than twenty-five dollars, with costs of prosecution for each offense, to be recovered by civil suit before any justice of the peace, said fines, with costs, to be paid into the treasury of the county, where the offense was committed, to the credit of the fund provided for the payment of the county inspector of mines."—An act approved June 21st, 1883; in force July 1st, 1883.

BREAK-THROUGHS IN MINES WORKED BY THE ROOM-AND-PILLAR SYSTEM.

It will be seen by referring to sections 5 and 6, of chapter 117 Laws of 1883, providing for the ventilation of mines, and the measurement of the same, that they refer more particularly to the longwall system of working out coal, than to the room-and-pillar system. Now while those two sections may be considered practicable in the former system, they

are, to a certain extent, impracticable in the latter. It is an easy matter to circulate air in and around the working faces in longwall work, but it is not so economical and practical in room-and-pillar work.

In longwall work the working faces, practically speaking, are the air courses of the mine; but in room-and-pillar work the break-throughs, and the faces are the air courses so far as the working places are concerned. It is not practicable nor is it necessary, unless in mines where large and dangerous quantities of fire-damp are generated, for air to circulate close to the working face of each and every room. The mutual diffusion of the air alone is sufficient to keep the room in a safe and sanitary condition, provided the air current passes such room at a reasonable distance from the working face. Both miners and operators will agree upon this fact. It would be a great and unnecessary expense to an operator of a mine, worked by the room-and-pillar system, to have to carry air close to the face of every room. It can only be done by carrying with the room a close board brattice, or partition, which would have to be extended as the working place advanced, and would require a large amount of lumber and expense for its erection.

As a practical and economical substitute for the brattice in our mines, which are mainly free from dangerous quantities of fire-damp, I would suggest that a limit be set on the distance that rooms can be driven in advance of the break-through, beyond which another one is made. I would suggest that no working place be driven more than fifty feet in advance of a break-through, or airway, in a mine, when no dangerous quantities of fire-damp are generated; and that all break-throughs, or airways, except those last made near the working faces of the mine, be closed up and made air-tight by brattice, trap-doors, or otherwise; and that it be obligatory, with some penalty attached, on the part of the miner in mines where it is customary for them to make the break-throughs, or airways, through the coal pillar, to do so at the distance above mentioned, when asked to do so by the owner, agent or operator of the mine. And, as soon as a new break-through, or airway, is made, that it be made obligatory on the part of the owner, agent, or operator, with some penalty attached, to close up and make air-tight the break-throughs, or airways, outside of the one last made by brattice, trap-door, or otherwise; and that it be obligatory, as provided for in the Laws of 1883, for the owner, agent or operator of mines, where fire-damp is generated, to circulate air in and around the mine and working places in sufficient quantities to render it harmless.

The law, as it now is, is all right, so far as the air going along the face in longwall work is concerned, but, as I have explained, the objection is to keeping it there in room-and-pillar work. It is hoped that the necessity of drawing a line somewhere will be seen. As it is now, it is a hard matter for the Inspector to settle a distance the same with all operators. Some contend, because there is no statutory provision to that effect, that sixty feet from the face is close enough, and others seventy-five feet, and others one hundred feet. The only way to settle this diversity of opinion is to provide by law a limit. Then there can be no question, as to the proper distance. If our seam of coal, for example, presents a distance greater than fifty feet would do so well, and keep our mines in at good sanitary condition as fifty feet will in the thickness of coal we have.

THE VALUE OF SEPARATE AIR CURRENTS IN MINES.

There ought to be different ventilated districts in our mines, especially in those of any magnitude, and there ought to be some limit as to the number of men that should be allowed to work in each district, separately ventilated. With separate equal currents, more air could be circulated with the same ventilating power than can be in one current, and a more plentiful supply of air would seek the last as well as the first man's working place, in a much purer and more healthful state.

To illustrate this fact, we will take a mine worked by the longwall system, where the seam of coal is but fourteen inches thick, and the mining clay below the seam four inches thick, which gives a working height of eighteen inches. For argument's sake, we will say that there are 125 miners at work, and that the mine is separated into two ventilation districts. One district has twenty-five men and the other has one hundred men. Now, on account of the thinness of the seam of coal, the sectional area of the airways practically are limited to a very few square feet; and as the miners are obliged to keep a light so that they can see to work, and to avoid blowing their lights out, and to avoid carrying away the heat from the miner's body too fast, leaving him uncomfortably cold, the velocity of the air current has to be regulated to suit these circumstances. This being the case in the district where the twenty-five men are at work, with clean airways and circumstances as they ought to be, nothing of an unhealthy nature can exist, as a sufficient amount of air is admitted, and velocity, passing them in a given time, but, on the other hand, in the district where the one hundred men are at work, altogether different conditions prevail, as will be seen further on. In view of the fact that the sectional area of the airway is limited, there cannot be a sufficient quantity of air circulated past the first man's room so as to reach the last man out of the one hundred in a pure and healthful state without making it very uncomfortable and cold for the first man to work in, and he be able to keep a light to see to work by. In cases of this kind, it is looked upon as a punishment, as a punishment, because so much air is in circulation, when the complaint is only made by the first few men that the air current passes. In consequence of a complaint from

the first men on the current, the furnace is kept down until the velocity is reduced. This condition of affairs is often met with by the Inspector. On being reprimanded for keeping poor air the pit boss will often say that So-and-so complained of too much, and to prove it, just ask him to suit them.

Admittedly, now, that the fire current is entirely suited, let us follow the air current from the beginning of its journey to the end of it. It passes on from place to place, from one man and boy to another, from one lamp to another, gathering noxious gases from the exhalations of the miners; from the combustion of the lamps and combustion of powder, and from gases generated from the coal and accompanying strata, and before it reaches its destination it is so charged with impurities that it is injurious for any living being to breathe it. It is often impregnated with carbonic acid (black-damp) to such an extent that the miner's lamp is lighted with difficulty, his time being employed in encouraging it to burn.

Now we will say, for argument's sake, that this same mine working 125 men, is divided into four separate and distinct currents, each current ventilating in round numbers 31 men. In the first place we split the air in longwall work at the head of the main entries on both sides of the mine, which is generally of large dimensions, and by so doing we increase the sectional area of the airway to double its former size, while at the same time we do not increase the rubbing surface or friction arising from the air rubbing on the top, bottom and sides of the airways, as the air, practically speaking, has only the same distance to travel in the four currents that it had in the two currents. Consequently we get a much larger volume of air with the same ventilating pressure; and, as a last consequence, we have a much purer and more healthful mine.

Now as the above refers to mines other than those of Cherokee and Crawford counties, it would be well to say something in regard to them, and also of the benefits that would be received with separate air-currents in them. While there is a much thicker seam of coal in the mines of those counties, and while it is a much easier task to circulate a large volume of air in them with the same ventilating pressure, I do not think it will be saying a word against them, to say that they much need a larger volume of air. We have to counteract the disadvantages arising from small airways on the one hand, and a large amount of noxious gases to contend with on the other, especially the gases arising from the combustion of large quantities of blasting powder, and which renders the air very impure to breathe. The coal in these two counties is mined by the process called "blasting from the solid," so that large quantities of powder are continually in use.

To make the changes necessary within the immediate reach of all operators, I would suggest that the limit of men allowed to work in one air current be placed at forty; and that it be made discretionary with the Inspector to curtail this number to at least thirty, in cases where, in his judgment, it shall be found necessary to do so to keep the mine in a sanitary condition.

In favor of the suggestion, it is encouraging to say, that Mr. Robt. Craig, superintendent of the Osage Adams mines, in Osage county, is making separate air currents in most of his mines at the present time, and whether there is a law made to that effect or not, the changes will be all made in time in his mines. He will ventilate a still smaller number of men in each current than I have suggested. I may state, also, that Mr. J. E. Carr, superintendent of the Leavenworth City shaft, has his mine at present separated into four distinct and separate air currents, and says he shall have it divided up into ten before he is satisfied. This mine needs a larger volume of air than any other in the State; not because it gives off fire-damp, nor because they use so much quantities of powder, but because it is so deep and extensive that the heat given off from the strata and from the slow combustion of the gob-waste, or excavated ground, makes it somewhat uncomfortable for men to work in. Near the face of those works a man will perspire without doing any work, and nothing but his pantaloons on. I presume this does not injure a man's health as much as one might think, but no doubt it keeps him from performing a certain amount of labor that he could do if in a cooler atmosphere, which can be secured by having more separate and distinct air currents in the mine. I do not suggest, however, that the mine be made to cover the above, some specified time be given each operator to accomplish the changes sought for.

The bread-fruit tree grows every where in Southern Central America, and is a veritable forest king. It attains immense proportions, the trunk often being from 10 to 12 feet in girth, and the branches reach out so as to cover a circumference of perhaps 100 and 150 feet. Its leaves are very large and thick, of a dark green color on one side and a silvery tint on the other. In shape they somewhat resemble a broad vase or flower pot 12 or 15 inches long and 10 wide. The fruit, with which one tree will supply a whole neighborhood, looks like a small, oblong water melon with a rough rind, and takes a yellowish tint when ripe. It forms an important part of the food of the natives, who prepare it by splitting it open, putting a small piece of fat salt pork in a natural cavity in the center of it for morning and evening, and then baking it. The taste suggests something like a cross between bread and potato.

THE MINING HERALD AND COLLIERY ENGINEER is \$2.00 per year; the miners' slope level cannot be had for less than \$2.00. We will furnish both for \$2.50, cash, to accompany each order.

THE MINERS OF MUSKINGUM COUNTY, OHIO.

From the Report of Thos. B. Bancroft, State Inspector of Mines.

In Muskingum county there are 10 mines of the larger class and 46 small mines. The latter employ but from two to eight men each. The seams are low and the ventilation in most of them is very deficient. The coal is brought from these mines by dogs, to avoid the expense of taking down the entry roof to admit of the entrance of mules. The coal is hauled by wagons to Zanesville, except such as finds sale in the immediate vicinity of the mines. Some of these mines increase their force for short seasons to more than 10 men, yet almost all of them are without artificial means of ventilation. Owing to the smallness of its mines this county has not heretofore received that attention from the department that its aggregate production would seem to warrant. While its output is in excess of several other counties of the State, and while the number of miners in the county is also greater, yet, from the fact that so few men are employed in each mine, their condition has been somewhat neglected in the past. An effort has been made during the past Summer to improve their condition, but the cases a peculiar one and obstacles have been met with that do not exist elsewhere.

But little of the coal mined in the county is shipped by rail or water to its market. The greater portion of it is consumed in the county and is the product of small mines back in the country and off the line of railroads. These small mines, while numerous, are confined to a small territory and are mostly within easy reach of each other. Many of the owners are men of small means and unable to go to other expense, in the way of improvement, required by law in mines that employ ten or more men. For by far the greater portion of the year they employ only from two to six men each, and many of them work but one or two miners during the Summer. In Winter time, when the force is increased, their natural ventilation (where any attention whatever is given to the air courses) is probably sufficient, owing to the cold air on the surface, but in Summer, when but one or two men are working, there is in most cases absolutely no circulation at all.

Yet the solitary miner, working without a companion to assist him in case of accident, and amidst all other dangers that surround him in his avocation, should receive the same protection from the State as his brother, who is more fortunate, in that he is employed in a mine working more than ten men, and hence more directly under the protecting arm of the law.

Where a mine does not come up to the legal requirements, or the owner refuses to conform to the same, the inspector can, by injunction, reduce the working force to ten men. Yet these mines do not employ ten men, except in Winter time, when the chances are that the natural ventilation will come up to the amount prescribed by law. There is but one resource left to these miners, and that is under section 306, of the Revised Statutes, which reads as follows:

SECTION 306. The provisions of this chapter shall not apply to or affect any coal mine in which not more than ten men are employed at the same time; but on the application of the proprietor or of miners in any such mine, the inspector shall make, or cause to be made, an inspection of such mine, and shall direct and enforce any regulations in accordance with the provisions of this chapter that he deems necessary for the safety of the health and lives of miners.

By this section it will be seen that the inspector has no authority over these mines, unless called by the miners, in any mine to inspect and examine the mine in which they are working. When this is done his directions must be carried out as in the case of larger mines. But the miners hesitate to call upon the inspector, fearing they may incur the displeasure of their employers and lose their situations.

The department is anxious to do all in its power for these men, and, as before remarked, has endeavored to ameliorate their condition as far as possible, but is unable to suggest any remedy for the evil. The case is a singular one. Here is a whole county, whose output is very considerable, yet, whose mines, with few exceptions, are the smallest and not directly under the supervision of the inspectors. It is doing no injustice to these mines to say that, as a class, they are the poorest ventilated of any in the State, and that but little attention is paid among them to the provisions of the law or the health and comfort of the miners. To bring all mines in the State, irrespective of the number of men employed, under the provisions of the law, would require a largely increased inspecting force, and to make an exception in the case of Muskingum county would be a manifest injustice to the other small mines of the State.

An Important Local Industry.

It is to the credit of the large companies and individual operators throughout the Lackawanna and Wyoming Valleys, that nearly all their work is done at home, and the largest proportions of it at

the establishments above named. It is quite certain that it is done quite as low and as well as it could be done elsewhere. The Vulcan Iron Works at Wilkes-Barre, Pa., is the outgrowth of a small establishment founded nearly forty years ago, by Richard Jones, one of the best mechanics in iron work the country has produced. By dint of untiring energy, and strict attention to business, coupled with an integrity and reliability which no consideration could swerve from the correct line, Mr. Jones unaided by any capital except what he had accumulated by his own industry built up a thriving business. Some twenty years or so ago, some of the Wilkes-Barre capitalists, among whom were the late H. B. Wright, L. D. Shoemaker, L. C. Paine and R. J. Flick, became interested in Mr. Jones' work, and a stock company was formed, the latter retaining a half interest. New and larger buildings were erected, the latest improved machinery introduced and from that day the business has been an uninterrupted success. The establishment now ranks with the most extensive of the kind in the country, and the work it turns out is not excelled anywhere. About ten years ago Mr. Jones was removed from the scene of his earthly labors, and was succeeded by his son, E. H. Jones, under whose superintendence the business and facilities of the establishment have grown and flourished. In these days of business it is seldom that an establishment of this kind has continued so long under practically one management, and had so uniform success. The fact speaks volumes for the care and business tact of those who have had the charge of it, and is sufficient guarantee that those who patronize it will be honorably and justly treated.—*Carbondale Leader.*

THE SHAMOKIN REGION.

Important Improvements Being Made in and Around Shamokin, Pa.

Cameron colliery will in a short time undergo extensive improvements. It is probable that when Luke Fidler colliery resumes work, about the first of next month, the Cameron will lay idle for some time to make improvements. Ground is now being excavated on the mountain east of the breaker for the foundation for several boilers and an engine, which will be placed in position there for the purpose of putting in a dirt conveyor which will scrape all the coal dirt and refuse up the mountain. This is something entirely new in this region, but has been worked successfully at the Lykens and Williamstown collieries. Workmen are engaged raising the railroad at the south end of the breaker so that the cars when started will run under the breaker to be loaded of their own accord, doing away with the inconvenience of pulling the cars with mules. In the second lift of the west slope a gang of men are drilling for a seam of coal. A large double hoisting engine has recently been put in position and about the first of next month, three wagons will be hoisted out of the deep slope at a time instead of two. The boiler explosion on Monday afternoon of last week compelled the colliery to lay idle until Thursday. Two of the boilers have been taken out and two more are unfit for use. John Muller's iron works are at present making four new boilers, which will shortly be put in position, making a nest of 23 boilers. This colliery is one of the largest in the region, running through from 650 to 700 wagons of coal per day and employing 870 men and boys.

Luke Fidler colliery has been idle since the 1st of May. The old breaker was torn down and a new one, much larger, with entirely new machinery of the latest improved character, is being built. In the mines extensive improvements are also being made and several small locomotives will be put in the tunnel to draw out the wagons. Arrangements are also being made to hoist two instead of one wagon at a time out of the slope, greatly facilitating an increased shipment of coal. A dirt conveyor will be constructed on the mountain north of the breaker to scrape all the coal dirt and refuse up the mountain. A timber slope and air course is also being driven and a fan constructed for the air course. The entire workings are being rebuilt or remodeled and everything is done to greatly increase the shipment of coal.

At the Stirling colliery two new pumps are being put in the slope to take the place of two old ones, which do not answer their purpose. Arrangements are being made so that in case of a heavy rain the mines will not be flooded. A new line of eight-inch column pipe and 4½-inch steam pipe has been run down the slope to the new fans. A new fan was recently put into operation near the top of the slope.

Bear Valley colliery on Monday morning of last week commenced working half time on account of a scarcity of coal. A new tunnel on the east side of the shaft will be driven, the proposals for the driving of which will be in to-day, and the prospects are that the colliery will, after the tunnel is finished, resume working full time.

Preparations are being made at the Big Mountain colliery to put in a small engine to pull wagons out of the mud drift. This is a big improvement on the

former plan of pulling the wagons out with mules. Ground is also being broken for the foundation of a fan which will be placed on the outside of the mines.—*Shamokin Herald.*

CONTINENTAL COLLIERY NOTES.

Extracts From Papers Written by Geo. E. Andre, P. G. S., M. E., &c., for the "Colliery Guardian" of England.

The punishment meted out to the Belgian colliers by the Socialist brotherhood, whose headquarters are at Ghent, has not been sufficient to deter the miners of the Borinage from continuing the offence. The desire to strike has become a mania among the Belgian colliers, a chronic disease that will not readily yield to treatment. Every day brings tidings of fresh strikes and of resumption of work by bands of previous strikers. In this state of things the mine-owners have been compelled to bestir themselves in self defense. They announce that henceforth every mine laid idle will be kept idle for at least seven days. It is amazing that the miners should be willing, at the bidding of the lazy and the dissolute among their fellows, to increase the difficulties of the situation by a course of action that cannot possibly benefit them in any way.

I notice that Pieler's lamp is just now attracting attention in France. It is being written about in the newspapers and made the subject of papers read before mining institutes. I have never met with this lamp in England, and I doubt if there be half-a-dozen in the country. Yet the lamp offers advantages of great value, and has stood the test of experience on the Continent. In Germany—the country of its birth—it is now commonly used, having displaced the Davy in a large number of mines. It is to be met with frequently in Belgium, and now the French are adopting it eagerly. As it is so little known in this country, I may say that Pieler's lamp is intended solely for testing purposes, that it burns alcohol, and that it reveals the presence of fire-damp when the latter is present in the atmosphere in any proportion greater than 1 per cent. In this extreme sensitiveness lies its value. The lamp is described in the report of the Royal Commission on Accidents in Mines as follows:

"Pieler's is a large Davy lamp constructed to burn alcohol with an Argand wick. The air supplied to the inner part of the flame is admitted by a tube, protected by superposed discs of gauze, which passes vertically through the vessel containing the alcohol. Around the flame is a short conical chimney, open above and below, and the flame is so regulated that it does not appear above the chimney, its height being, therefore, from 1 to 1.25 in. In gas this spirit flame yields a much more conspicuous cap than can be produced by the flame of ordinary vegetable or animal oil. . . . The Pieler lamp is obviously a most sensitive gas detector; but in its present form it is quite inadmissible for use in well ventilated mines, for the following reasons:—The flame is easily extinguished by a very moderate current; and if the lamp happens to come into an explosive mixture of gas and air an explosion is almost certain to be caused in a few seconds. The lamp could be rendered less dangerous for general use by enclosing it in a case, and, as far as we have been able to observe, its power of indicating the presence of gas would be but little if at all impaired." These remarks of the Commissioners are evidence that their work has in some at least of its particulars, not been brought up to date. The defect here alluded to was long ago remedied. In the earlier construction the combustion of the spirits and the gas caused the gauze to become red hot in a few seconds. But in the lamps now in use the flame is extinguished by the ignition of the gas. * * *

The new law, which in Germany provides a sufficient allowance of pay to the workman who is unable by reason of sickness to continue his occupation, has brought to light some interesting points in the health of workmen. The first observation made was that when abundant relief is afforded in illness, the health of the community rapidly deteriorates. This fact was observed by Dr. Borgh, the secretary of the Aix-la-Chapelle Chamber of Commerce, who took an unkind view of it, and published a pamphlet to teach the miners in these matters how to distinguish between real and feigned sickness. Among the coal mines there has been much sickness since the new law came into force; but other and more startling effects have been observed since Dr. Borgh directed attention to the matter. One is very curious. According to the statute, if a workman is laid up thirteen weeks together, his pay ceases for that year at the expiration of that time; but, if he recovers before the whole of the thirteen weeks have elapsed, he may fall ill again after an interval of a few weeks, and go on for another three months. Observation has shown that a very large proportion of the invalids recover suddenly and completely between the twelfth and thirteenth week; but this is not all. The watched pot is said, never boils; but the German doctors have discovered that the watched invalid quickly recovers. I chronicle these interesting observations for the benefit of my countrymen who may think it desirable to establish sick funds of this sort.

THE KEELY MOTOR.

ANOTHER EXHIBITION OF THE WONDERFUL MACHINE.

From Philadelphia Times.

John Worrell Keely, the motor man, gave an exhibition on Saturday afternoon last in his workshop, at 1422 North Twentieth street, of his big engine, which has just been completed after a year of experiments. Inventor Keely has been giving mysterious entertainments to capitalists, scientists and others for the past dozen or fifteen years, but none of the former exhibitions were so mysterious or so wonderful as the scientific reception of yesterday. Mr. Keely used all the terms known to science and a little scientific vocabulary of his own in explaining to his audience of thirty how the thing was done. The audience, like former audiences, nodded their heads in approval and looked wise and as usual knew just as much about Keely's secret when the show was over as they did before it began. Mr. Keely told those present that it was the first trial of his newest and biggest engine, and that he was just experimenting and didn't know whether the engine would run or not. As he wiped the trickling perspiration from his face he added that his brain was all confused, but he guessed everything would go all right, as he had the chord of a mass and had made two ejections of atmospheric pressure from the big engine and had secured an introductory impulse.

The scientists and capitalists looked at each other helplessly and then smiled at Mr. Keely, and a number said in chorus:

"Oh, yes, certainly."

Inventor Keely has heretofore given his exhibitions with small machines and the funny looking copper globe forty-eight inches in diameter filled with "resonators," which he used yesterday, is about three times larger than any machine he has ever used. He said that he could produce 250-horse power with what looked more like a washing machine than anything else. A hum of wonderment ran through the little workshop and then Mr. Keely put rosin on his fiddle-bow, tuned the forks on the drum of his "liberator," connected a copper tube six feet long and one-eighth of an inch in diameter with a seven-pint cylinder and then connected another copper tube a thirty-second of an inch in diameter and ten feet long with the engine from the seven-pint cylinder. The sound liberated from the drum of the "liberator" passed through the first tube into the cylinder and then into the smaller tube and into the copper globe of the new machine. The bottled chords of the mass which Mr. Keely had chosen for his power yesterday would run the machine, he said. Something did run it. The big copper globe revolved faster than any fly-wheel or bit of machinery ever seen in motion in a machine shop. The copper globe, forty-eight inches in diameter, made seven revolutions every second, and an independent belt-wheel at one end of the copper globe, which Mr. Keely said ran from sympathy of sound, made three hundred revolutions a minute, and its velocity frightened everybody in the room, including Keely, who danced around the shop and told everybody to keep out of the way.

The belt-wheel and the copper globe went around so fast that they made a noise like the spinning of a huge top. The noise sounded too, like the rushing, howling of a furious wind as the copper globe cut the atmosphere and turned it into dripping water on the floor underneath. The hot little workshop was chilled in two minutes, and then as Keely, greatly excited, turned the cock of the vibrating tube and made the copper globe calm down to almost a standstill, the capitalists and scientists clapped their hands and took off their hats.

"Ain't that fine, gentlemen?" asked Keely, smiling.

"Greatest thing on earth," answered Albert R. Edey, the president of the Keely Motor Company.

"Wonderful," came from a dozen mouths, and then Mr. Keely started the copper globe off again with all its power. It shook the little workshop from cellar to ceiling and rattled the window-panes.

"I can make the screw of a steamer make six thousand revolutions a

minute with this machine," shouted Mr. Keely through the howling of the globe and the belt-wheel.

"Then we'll be able to go to Europe in one or two days before long," remarked a man in the audience.

Mr. Keely stopped the engine again and then made the globe revolve in either direction, just as he pleased. The bottled sound in the "liberator" was just as strong when he stopped as when he began, and he said the machine would run on all day without charging the "liberator" again with a sound from drawing the fiddle-bow over the tuning fork.

Several tests were made with the lever, which have been described frequently. When the exhibition was concluded L. H. Taylor, Jr., the broker, moved that a vote of thanks be tendered Mr. Keely. Everybody shouted "aye" and a ringing applause followed. Mr. Keely will go away tomorrow for ten days' rest; then he will return and study out some vibratory sounds, so that he will have the machine more thoroughly under his control. He doesn't know how long it will take him or what the next step will be, but he said the public would hear from him very soon.

Those present were Jacob H. Linville, ex-president of the Keystone Bridge Company and now president of the Electric Telegraph Company; Dr. Strawbridge, Dr. D. F. Woods, William Beckel, F. A. Holmes, Colonel J. E. Peyton, M. Richards Muckle, Jr., T. C. Smith, of the Westinghouse Air Brake Company; W. W. Jenkins, John S. Muckle, L. H. Taylor, Jr., Henry Smyer, P. S. Dooner, Edward A. Green, Charles B. Collier and Secretary Schuellerman, of the company, all of this city, and the following from New York city: Albert R. Edey, president of the Keely Motor Company; Dr. Wilfred Hall and Dr. Hudson, of the Scientific Arena; Dr. George Evans, F. G. Green, C. K. Dutton, Dr. C. M. Richmond, W. Lawty, Augustus Siskel and T. Harper.

When the visitors had left Mr. Keely told the reporter that by laying little tubes under ground connected with his engine, if he built a large one, he could run all the machinery in every factory in Philadelphia by simply drawing his fiddle-bow once every morning and letting the sound into the copper globe.

NEW DELORADO DISCOVERED

EGGS GROW ON TREES, AND EVERY OYSTER HAS ITS PEARL.

NEW YORK, July 26.—Col. Pat Donnan of Dakota has just returned to this country from Honduras, bringing with him a big scheme and an enthusiastic admiration of the little Central American republic. His scheme is to establish a national banking system in Honduras with nearly every privilege a firm could desire given by the government. He is now in New York in the interest of this enterprise. When he was seen last evening at the Grand Union Hotel by a reporter he was not averse to talking about his plans, which he unfolded in the most enthusiastic and confident manner.

"It is vital," he began, "that Honduras should have a banking system. At the present time the entire exchange system is carried on by means of private drafts. The merchants are forced to carry large sums of money on deposit in this country and in Europe, often to their great inconvenience, in order to accommodate their patrons. To buy an exchange draft on New York or New Orleans fetches a big percentage."

"What are the resources of Honduras?" asked the reporter.

"They are simply wonderful. The distance from centers of population and the difficulty of access have heretofore rendered the natural wealth of Honduras almost useless. There is no region in the world of the same area that has such natural advantages as Honduras.

"Cotton, sugar, rice and coffee grow spontaneously all the year around. To plant them all that is necessary is to run a long machete into the ground and then throw in the seed. The plants begin to bear at once, and picking can be done at any season of the year. They flourish as well as Canada thistles do, and spread everywhere. All of the finest and rarest fruits grow there among them being fifty varieties scarcely known in the United States.

"The bread fruit grows wild in great abundance. When the careful housewife wants a loaf of bread she does not have to plunge up to her elbows in flour and tire herself out mixing the dough. All she has to do is to go to the tree and knock down the fruit, cut it open, place in the natural cavity a piece of bacon for flavoring and put it in her oven. Why, the country is so prolific that even excellent substitutes for eggs, for cooking purposes, can be found growing wild on trees. The dirt and bother of keeping cows are avoided by the excellent milk and cream furnished by nature in the coconuts.

"Oysters? Well, I should say so. The reefs of excellent eating oysters are so thick that they blockade navigation, and the pearl oysters are everywhere. There is a wonderful cattle grazing region, as well watered as the western part this State, and the beautiful streams run over beds of sand that is full of gold.

"There is one railroad there now. It is 37½ miles long and runs from Puerto Cortes, on the Gulf of Mexico, to San Pedro. This so-called road is a narrow gauge, and runs all along under an archway formed by palm and other trees that meet above the tracks. It takes all day to make the trip. The train stops several times to take on wood, and get water by the bucketful at the creeks on the way. They burn valuable woods in the locomotives, and the smoke has the fragrance of holy incense. When I stopped for dinner I asked a woman for some lemonade, and she went out in her yard and knocked down some lemons to make it.

"As to my scheme, I have obtained concessions to establish a national bank at the Capital, with branches at three principal seaports, and am authorized to issue \$500,000 in greenbacks that will be legal tender for everything, including taxes, customs duties, etc. The bank is authorized to lend money at any rate it can get, and all the bank's necessary impositions will be free of duty. It is a scheme that will be a big success, and make loads of money."

A LUMP OF COAL.

THE WONDERFUL THINGS PRODUCED FROM OUR BITUMINOUS COAL.

Few persons have any idea of the wonderful products from a lump of coal—a lump of coal that is placed in the retort of a gas manufactory. Ordinarily burned, the combustion of a lump of coal results in carbonic acid smoke (which is merely soot, or rather the visible portion of smoke is soot), and the ash, in which are found silica, alumina, oxide of iron, phosphoric acid, sulphuric acid, potash, sodium, combined sulphur, sometimes traces of chlorine, titanate and other substances. In the gas retort a variety of products are obtained. The gas as it is carried through the hydraulic main to the purifying rooms takes with it tar and ammonia, the latter evolved from the nitrogen. The ammonia has to be washed out with water, in an arrangement by which the ammonia is gathered and saved. Tons and tons of sulphate of ammonia are thus made, and become an article of commerce. The sulphur is removed by caustic lime or oxide of iron. The carbonic acid is also removed by lime, but the carbonic acid can not be removed, and with several others remain in the gas after all efforts to remove it. The others give the gas its smell.

By distillation naphtha and asphaltum are obtained. Asphaltum is a dead oil, very useful to preserve wood. From this, too, carbolic acid is obtained, very important in surgical operations as being the most valuable antiseptic known. From naphtha, benzene, cumol, teluol and cymol are obtained. Naphtha, as is well known, is used as a burning fluid. Benzene is a solvent for grease and oils, very useful in cleaning old gloves and things of that kind.

Benzole treated with nitric acid produces nitro-benzole. This singularly enough, is used as a flavoring extract by confectioners and for perfuming soap. When used for this purpose it is known in commerce as the essence of myrrhane, which it is not, although it smells and tastes something like essence of myrrhane, or oil of bitter almonds. Nitro benzole is terribly poisonous, but not more so than some other adulterants used by confectioners.

From nitro-benzole aniline is obtain-

ed. This, when first obtained, is a perfectly colorless liquid, but darkens as it grows older. From aniline are obtained the coal-tar colors, which are so very brilliant. The colors are of all hues. The one known as "turkey red" is exactly similar to the red that used to be made from the madder root. Since the discovery of his aniline it has almost completely broken up the raising of madder root to get the turkey-red dye. It can be made much cheaper from the product of a gas factory.—*Hardford Times.*

* WANTED *

"Situation and Help" advertisements under this head, free to subscribers of the "Mining Herald and Colliery Engineer;" others 10 cents per week, advertisements not to exceed one inch.

Those applying for the positions here gratuitously addressed should enclose the necessary postage, for forwarding their letters.

WANTED.—A position as Superintendent or Mine Boss, by one who has the necessary certificates for Pit and Fire Boss. Can give good reference as to character. Address "F. R.," Box 148, Monongahela City, Washington county, Pa.

WANTED.—By a gentleman of experience in the management of coal mining. Holds certificates of service and competency. Makes his own surveys, and, if necessary, keeps books. Address "Cos.," MINSING HERALD office, Shenandoah, Pa.

WANTED.—A situation as Mine Superintendent or Mine Foreman, of coal or surface region. Has necessary certificates, and has had several years' experience in Colorado mines. Salary reasonable. A recommendation furnished. Address "S. J.," care MINSING HERALD, Shenandoah, Pa.

WANTED.—A Mining Boss; one that has certificate of competency, and must be well recommended. Also acquainted with pumps and endless rope system. American preferred. Address "E.," care MINSING HERALD. 30-1m

WANTED.—A situation as Pit Boss, having a certificate of competency. Mines shut down where last employed as Pit Boss. Thirty years' experience in coal mines. Willing at all times to make myself generally useful. Best of reference as to honesty and ability. Address "J. E.," Box 35, Dubois, Clearfield Co., Pa.

WANTED.—A situation as Fire Boss, Mine Foreman or assistant to Superintendent. Has Foreman's certificate; can give good reference as to character and abilities. Address "ROBERT MAGEE," Box 27, Nanticoke, Pa.

WANTED.—A situation as Superintendent or Mining Boss in the Bituminous coal region. Has necessary certificate. Reference where last employed as Superintendent for a Coal and Coke Company. Address "E. P.," care of MINSING HERALD.

A MECHANICAL ENGINEER and Draughtsman, thoroughly competent, and with a varied experience in the designing and construction of engines, boilers, machinery, structural work, &c., is open for an engagement.

Address "W. S.," 9 Bickerdike St., Chicago, Ill.

SITUATION WANTED.—A MAN of thirty-four years' practical experience of working and management of coal and metallic mines, sixteen years in Scotland and eighteen in America, desires a situation as Superintendent or Fire Boss, and can give prospect for coal. Has first-class certificate as Mine Boss, and can give testimonials of ability, sobriety and integrity. Also reference where last employed for a series of years, and where last engaged as mine boss. Address "A. M.," care of MINSING HERALD, Shenandoah, Pa.

WANTED.—A situation as Mining Boss in the Anthracite region. Thirty years' experience; have the necessary certificate. Address "H.," care MINSING HERALD, Shenandoah, Pa.

PIT BOSS WANTS AN ENGAGEMENT. Twenty years in Pittsburgh seam. Necessary certificates. Reference to former employers. Address "Miner," Woodville, Allegheny county, Pa. 16-2t

SITUATION WANTED.—A man of thirty years' experience at the mines, a situation as prospector of coal or mineral superintendent; willing to go West or other part of the country. Has considerable constructive ability, and willing to make himself generally useful. Salary reasonable. Address "A. J.," care of MINSING HERALD, Shenandoah, Pa.

WANTED.—By a certificated colliery manager, a position as Superintendent or Mine Boss, to take charge of works, either Bituminous or Anthracite, flat or pitching seams, longwall working, and circular shaft sinking, with erection of new colliery plant a specialty. Anthracite preferred. Is sober and reliable; with good references as to character and ability from former employers. Please address "M. E.," South Side, Pittsburgh, Pa.

"BURNING OF MOSCOW."

Fireworks with Dramatic Accessories.

In an inclosure open to the sky, occupying some 400 by 500 feet, near the easterly end of New York's popular sea beach Summer resort, there is nightly being presented to the public this Summer a pyrotechnical exhibition of a novel character, which our artist has made the subject of illustration on the first page. There is not much that is entirely new in the fireworks shown, although the beauty of some of the combinations of colors is remarkable, and it is evident that the chemical energy developed in their production is always under most skillful guidance; but these, in connection with the theatrical accessories and the scope given for their display in the place where the exhibition is held, combine to make up an entertainment which has attained great popularity, and is generally conceded to be a most delightful treat.

The stage setting, if we may so style it, occupies one entire side of the inclosure, to the depth of about 75 feet, and between this and the audience is a miniature lake, made to do duty as a portion of the river Moskva, there being some boats moving on it and others drawn up to what appear to be the docks and quays of the ancient Russian capital. At either side appear to be arched stone bridges, guarded by fortress-like parapets, suggesting the heavy stone fortifications characteristic of the medieval ages, and these extend along the water front, but far enough back to give room for the actors. They also form the walls behind which rise the miniature domes, turrets, and cupolas, in Oriental fashion, of that collection of palaces and churches known as the Kremlin, on the terraces of which are sentinels keeping watch. In the distance, almost upon the horizon, and apparently beyond the confines of a walled city of considerable size, is a blue streak, representing the winding course of the Moskva, the whole being an artistic arrangement of stage slides and painted scenes to give one a realistic idea of Moscow as it might have looked on that Autumn evening, seventy-four years ago, when awaiting the approach of Napoleon's grand army; while room is allowed between the stage slides for the explosion of fireworks and use of the artificial fires that are to portray the destruction of the city and mimic its falling walls and towers at the time that the noise and glare of the pyrotechnical display is at its height.

To obtain the largest possible amount of enjoyment from an exhibition of this kind, one should, probably, as far as possible, try to forget all of the "machinery" of the business, and be oblivious of the shortcomings of the actors, to thus aid the imagination to call before the mind the real historic event, yet as all who see it are inclined to ask how the effects are produced, we give, in the smaller views, illustrations, as seen from the rear of the stage, of the hinged and braced scenery, some parts turning on pivots and all arranged to be quickly thrown down into such semblance of ruin as shall best carry out the idea the piece is intended to represent. One of the small pictures also show the water serpent and water dolphin, and how they are made, a fountain of fire with a float to sustain it upon the water, and the manner of firing off the grand aerial bouquet of rockets with which the exhibition concludes. About 150 of these rockets are fired simultaneously, the burning of one rocket lighting the fuses of all the others.

The prime materials of the art of pyrotechny have long been well known, but experts, aiming at novel and striking effects, are constantly making new combinations. With gunpowder and its ingredients—niter, sulphur, and charcoal—are used a large number of other substances, such as sugar, starch, resin, camphor, leycopodium, the sulphides of arsenic and antimony, the metals iron, copper, zinc, magnesium, etc. Cast iron and steel are used in powder and small filings; they do not contribute much to the burning powder of the pieces, but when discharged into the air, by their partial oxidation cause brilliant sparks and scintillations, the longer the filings the brighter the red and white sparks they give. Copper filings give a greenish tint to flame, and those of zinc a fine blue color, but sulphur of antimony gives a less greenish blue, but with much smoke, while amber, colophony, and common salt give a yellow fire, although the salt must be very dry. Lampblack produces a very red color with gunpowder, and a pink color with niter in excess, serving for making golden showers. Yellow sand or glistening micaceous golden radiations. Camphor yields a very white flame and aromatic fumes; verdigris imparts a pale green; sulphate of copper and salammuniac a palm tree green, and litopodium burns with a rose color and splendid flame. Niter increases the rapidity of the fire, while sulphur retards it, and the charcoal of the powder emits those volumes of sparks which form the golden train of an ascending rocket.

In the exhibition are combined some of the best effects of the art of pyrotechny, as shown in the brilliancy and sustained power of the various lights

and colors given out by the rockets, wheels, stars, Roman candles, gold and silver rain, serpents, colored fires, etc., and the one or two set pieces generally given at the conclusion. The selection of materials for the effects desired is always governed by the laws of chemistry, as illustrated in every description of combustion, with known laws of mechanics being invoked to turn the force of chemical combination to the end sought—a work in which no small amount of practical experience and manual dexterity is required to secure the best results.

Of course, it is the forcing of the confined gases, caused by rapid combustion in various formed tubes and other shaped devices, out upon the air that gives the propulsive force of the different pieces, while the definitely measured proportion of the almost numberless ingredients furnish every conceivable hue and the varying degrees of brilliancy; but an enumeration of the many combinations now made by skilled pyrotechnists, and the startling means by which they are produced, would go far beyond the scope of the exhibition, the fireworks manufacture forming a special business of considerable importance.

The "action" of the drama is but brief, and is somewhat set out by various adventurous interludes, a gymnastic exhibition, marching and countermarching of soldiers, music, etc.; but the approach of the French army upon the scene is easily imagined from the increasing noise of bombs, flights of rockets, and readily assumed appearance of consternation of the actors. This is apparently subdued for a brief period as the solemn strains of the Russian national hymn strike the ears of the audience, while a procession of white robed priests appear at a miniature shrine of a Greek church and render a chorus of some classical music of somber character, which has a most striking effect across the water of the little lake, but which it is safe to say was never heard within the walls of a Greek church in Moscow at the time the audience is supposed to revisit it. Then follows increased alarm at the gates. The guns of the French cannoners as they draw steadily near, liberally assisted by discharges of giant crackers, thunder with ear-splitting effect against the wooden walls, bombs fly hurtling through the air over the doomed city, the bearskin caps of the French grenadiers appear at the entrance of the city, and the soldiers as of itself their columns press upon the retreating and now thoroughly terrorized Russians, who rapidly disappear within the nooks and byways of the city. The prisoners in the jails are liberated from their confinement, and with torches appear to light the fires, amid which are now seen and heard the roar of the flames and the tumbling walls and general destruction of the city, the air being full of burning serpents, and the water alive with incandescent figures to suit every imagination, while the aerial bouquet of rockets is setting evanescent stars of every hue in the heavens above, with the disappearance of which, as a conclusion, we come back to comparative darkness and "the sober realities of every day."—*Scientific American*.

Foundations.

The modern architect has at his command means and appliances of the greatest utility, which were unknown to men in former times. Steam can be brought to aid in driving timber piles, and simple applications of water or air will sink hollow iron piles with comparative ease. The old Eastern plan of forming deep wells and then filling them up with concrete has been too much neglected. Modern well sinkers will go down in any depth almost to any depth—certainly to any depth required in practice; and a secure foundation may thus be made for the loftiest structure in the most difficult ground. Masses of concrete or of brick or stonework placed on a compressible substratum, however cramped and bound, may prove unsafe. Solidity from a considerable depth can alone be relied on. Enlarging the area of a base or foundation by footings can be resorted to; but mere enlargement of area may not in itself be sufficient. A lofty structure which is to stand secure must have solidity sufficient to maintain each part in the position in which it is first placed. Foundations are too frequently slighted, or labor and material are wrongly applied. The compressibility of colitic and tertiary clays can only be overcome by piling, deep sinking, heavy ramming, or heavy weighting. The point of bearing must be carried below any possibility of upward reaction. A heavy embankment or heavy pile of building frequently disturbs the surface ground at a distance of many yards, the subsidence causing a corresponding rise around or on either side, as the case may be. A tall chimney or tower of like proportions, built on such a foundation, if not made safe to a sufficient depth, would most likely become a "leaning tower," if not actually a falling tower. Probably the depth of a foundation on compressible ground ought not to be less than one-fourth the total height of the building; that is, for a shaft of 200 feet the foundation should be made secure to a depth of 50 feet. This could easily be done by piling, or by well sinking and concrete.—*Sir E. Rastlinton in the Architect*.

Rolling Window Glass.

A Pittsburg mechanic who desires that his name shall be withheld for the present, has secured by affidavit the priority of claim to a patent for a new process of manufacturing window glass which bids fair to revolutionize that industry. The new process simply consists of rolling the glass exactly as iron and steel are rolled instead of blowing it. By this process the molten glass is brought in a ball from the furnace and conveyed over movable iron plates to the rolls. These plates are heated under-

neath by natural gas flames issuing from a net work of perforated pipes, thus maintaining the glass at a malleable heat and at the same temperature throughout its surface. The ball is then rolled into a sheet by the two high reversible rolls. These rolls are hollow and have a fixed natural gas pipe running through them, perforated all along. The flame from these pipes maintains the rolls at a high temperature; so that they preserve the malleability of the glass during the process of rolling. The sheets pass from the rolls to a movable plate heated in the same way as that over which they passed to the rolls, so that they are not allowed to chill. They then pass to the annealing furnace, are rubbed until the surface is smooth, just as plate glass is rubbed, and then go through all the same processes as blown window glass. It is claimed that ten times as much glass can be produced by this process in a given time as by blowing it. No practical test of this process has been made yet, but one will be made as soon as a patent is secured. Old and experienced glass-workers say that the rolling of window glass is perfectly practicable by keeping the glass hot during the operation of rolling. William Clark, of this city, tried to put the same idea into practice thirty-five years ago, but failed because the glass chilled so rapidly after being rolled that it became too brittle for use. The inventor claims that he will overcome this difficulty by using natural gas to keep the sheets hot.—*National Labor Tribune*.

P. R. R. Relief Fund.

The Pennsylvania Railroad Relief Fund which was gotten up several months ago is now the topic of conversation among the railroaders. When this association was first organized it created quite a sensation on the railroad, and the position the matter assumed looked as though there would be a strike and general stagnation of business on the road. Committees, composed of railroaders, were appointed by the men, who called upon the officials of the road to learn the nature of the organization, and, if possible, to make some changes in the same. The officers of the road listened to their petitions and said that they would change the constitution and by-laws of the association as well as the paying of the benefits. But this was never altered, as it is comparatively the same now as it was when first instituted. At the beginning of this fund very few of the employees were inclined to join it, but for the last two weeks over half the employees have signed their names to the Constitution. The Pennsylvania Railroad employs about 43,000 men on its main line and branch roads, 20,000 of whom have joined its organization. It was expected that four-fifths of the force would be annexed by August 1. The employees were allowed until August 1 to join without standing a medical examination, and after that time all that wish to connect themselves with the relief fund, will have to be examined by the company's physician. If a workman does not pass a good examination he cannot join the fund. Many of the men have expressed themselves as desirous of joining, and others assert that they will not join even if they are compelled to quit their positions. On the Pittsburg division the men complained of the organization being too severe, and that it offered no protection to their families in case they should be disabled. However, it appears that they have considered the proposition favorable, as a large number of them have become members. The company does not directly say that its employees are compelled to leave their families in their situations, but it is understood that when there is a suspension to be made those who have not joined will be the first to suffer.

Fire From Steam Pipes.

Glaser's Annalen says: After wood has remained a long time in contact with steam, hot water, or hot air pipes, the surface becomes carbonized. During the warm season, the charcoal absorbs moisture. When again heated, the moisture is driven off, leaving a vacuum, into which the fresh air current circulating around the pipes rapidly penetrates, and imparts its oxygen to the charcoal, causing a gradual heating and eventually combustion. The rusting of the pipes contributes also to this result, inasmuch as the rust formed during the hot season may be reduced by the heat of the pipes to a condition in which it will absorb oxygen to the point of red heat. The same article also notices that a building was set on fire by pitch distilled out of pine plank placed nearly three inches above a steam pipe, which dropped on the pipe and took fire.

The transportation of petroleum is bulk in attracting attention just now. Seafaring men say that to carry this product in bulk on ocean voyages is a great deal more dangerous than carrying any sort of grain in that manner, owing to the liability of leakage in the compartments. The small ships which have been used on the Caspian Sea meet no such terrific tossing and strains as the Atlantic vessels encounter, yet the hazards do not seem to have a deterrent effect. A German ship altered for bulk-carrying recently took on 64,000 gallons from Philadelphia, and the steamship *Primate*, in the iron trade between Philadelphia and Cuba, is to be fitted with 12 compartments to carry 1750 tons of oil. These innovations are regarded with great interest by the shippers and dealers in petroleum.

The female employees in a factory in Burnley, England, are forbidden to wear their hair "banged." This is to prevent them being caught by the hair in the shafting. The proper precaution would be to place shafting where it could not catch the hair of girls anywhere about the floor or the stairways.

COAL MINING.

System of Working Out Coal in Kansas Coal Mines.

From Mine Inspector's Report.

ROOM-AND-PILLAR SYSTEM.

The coal mines of Crawford and Cherokee counties are worked on what is known as the room-and-pillar system. First, a narrow entry is driven from the shaft or slope, as the case may be, called the main entry, ranging from six to twelve feet wide, according to the character and firmness of the roof. Off this main entry, when the coal seam is comparatively level, at intervals of 300 feet and at right angles to the main entry, cross-entries are driven off, and off these cross-entries at right angles rooms are turned off to the right and to the left. If the cross-entry is driven single, and if they are driven double to secure the better ventilation of the mine, rooms are turned on the right-hand entry to the right, and on the left-hand entry to the left.

The size of the pillars left in, and the distance from one room centre to the next room centre, is governed mainly by the thickness of the superincumbent strata above the coal which has to be supported, and slightly by the noticeable firmness and texture of the coal to stand a heavy weight without crushing, the softness or hardness of the bottom, and firmness of the roof—these things have all to be considered. In the greater portion of the mines in these two counties, now in operation, the superincumbent strata range from twenty to fifty feet in thickness above the coal. A sufficient pillar in these mines to support this weight without giving is from three to six feet, and the width of the rooms from eighteen to twenty feet, according to the character of the roof.

This would allow the rooms to be broken off on the entries at a distance from centre to centre of 24 to 26 feet. However, we have one mine in Crawford county, 116 feet deep, and one in Cherokee county, 140 feet deep. The superincumbent strata in these mines need pillars much larger than the above mentioned—at least twice the thickness.

The rooms, after being turned off these cross-entries, are driven out 150 feet, taking one-half of the coal between the cross-entries; the rooms on the other cross-entry driving back and taking out the remaining 150 feet. Thus all the 300 feet of coal left between the entries, excepting the pillars, is taken out. In the shallow mines, where the superincumbent strata would break down, leaving an open rent from the surface to the interior of the mine, so that water would get in from the surface every rain, the pillars have to be left in to avoid this, although they do not do it in all instances, as rooms will sometimes cave between them. But this is tried to be avoided as much as possible.

Thus it will be seen, a part of the coal is left, and is never recovered. In the deep mines now in operation, and in those that will be put in operation in the future, this pillar-coal need not be left in. After a new panel or section of work is opened up, and the rooms from one parallel entry to those of another have been driven to their meetings, the pillars can be drawn back without any danger of letting in surface water. Thus all the coal can be excavated without any loss in the deep mines. Of course it will need a little additional outlay at first for the entry work, but the operator will be sufficiently compensated for this when the pillars are drawn back.

The room-and-pillar system of work is only carried on in two other counties of this State outside of the above mentioned, namely, Linn and Lincoln. In all the other counties, the longwall system prevails, which will be described further on in this report.

Before leaving this description of room-and-pillar work, I wish to give a brief account of some of the irregularities and difficulties that have to be contended with, and which cut into the system in this field, and hinder and prevent the superintendent or mine boss from economically carrying out the system to perfection, or practically, in the manner above described. In a number of cases previous to this writing, there has been found along the outcropping edges of this coal field, and in some instances a good ways into the interior, a soft roof and poor coal, which runs in serpentine or stream-like streaks, varying in thickness from a few feet to hundreds of feet in localities. Where such faults are found they are not often found singly, but in nests, resembling that of a country cut up with draws and ravines. Very unlucky is the management of a coal mine that has these natural disadvantages to contend with, and endeavors to get coal out at a price low enough to compete with the neighboring management of some other mine which has no soft roof or poor coal to contend with.

There is also found in this coal seam horse backs, or clay-veins, as they are sometimes called, which are general prevailing faults in this coal field. These vary in thickness from a few inches to as high as fifteen feet. Go where you please, wherever this coal seam is being developed, and you will find these clay veins. They cut the coal entirely out in every instance, even in cases where they are but a

few inches thick, leaving the coal its full thickness, and in most cases a little thicker on each side. They will be found running throughout the whole coal field in stream-like fashion, and in every conceivable direction, so that as before stated, instead of being able with economy to turn rooms and drive them at right angles from the entries of the mine, you have to drive them in a direction with these horsebacks, to avoid cutting them and to dodge them if you can profitably do so. If not, you turn your room and cut square through them, six feet wide, and open your room up again to its width on the other side. Thus it will be seen, that true systematic mining never can be practiced and carried out in this seam of coal.

In mines that have good roof and good coal each side of the horseback, they are considered in a manner now no objection, as every one in the coal business has them. Although they are evidently a natural disadvantage to the whole surrounding mining community, yet all are on a square footing, so that one operator has no advantage over his neighbor in this direction. And although we have this natural disadvantage to contend with, as before described, in this our greatest Kansas coal deposit, yet I will venture to say that mining operations are carried on and will continue to be carried on as successfully, all other things being considered, as in any other coal field of our neighboring States. Our miners make as good wages, and I believe, if steady employment could be given them, they would do better than in any other district of our neighboring States. I omitted to mention in the above description of the room-and-pillar system, that in coal seams that are not of sufficient height to admit of mules 14 or 15 hands high in the entries, after the coal has been mined away the roof of the entries is wedged or blasted down to make the height desired. This work is called in the mining language, "brushing" the roof down, which term will be seen frequently in the tables of this report.

LONGWALL SYSTEM OF WORKING OUT COAL.

In the mines of Leavenworth, Osage, Franklin, Douglas, Neosho, Bourbon, Shawnee, Coffey, Ellsworth, Cloud, Republic, Jewell and Russell counties, the longwall system of working out the coal prevails. The miner removes all the coal as the workings progress forward, and allows all the incumbent strata to fall down behind. This is considered the best system of all, but is only applicable to seams of moderate height, and with favorable accompanying conditions. Mines opened up on this system in some cases vary from 25 to 4 feet in thickness are generally opened up by narrow work. Large pillars of coal, varying in size to suit the incumbent strata, are left in for short supports. After the pillars are all cut around, rooms are started off at intervals of forty or fifty feet. They are again driven in narrow, six or seven feet wide, for a distance of five to ten yards as entry-supports. Then each room is widened out to the right and to the left until all are connected around the mine. Then from this point the whole coal is removed, allowing the incumbent strata to come down gradually behind and over the workmen. The roof of the rooms, roads and entries are brushed down, and pack-walls, masonry-like, are built with it along the roads as a support for the roof, and to keep it from brushing down other than gradually, and to keep the roadways as permanent as possible, until a distance of 150 or 200 feet is reached. Then a cross-entry or heading is cut across the face of those rooms, renewing them again; and so on until the mine is so far advanced from the shaft that the distance to haul the coal is too great for economical production. Then the mine is abandoned, and the plant moved to another field.

The coal seams in the mines of the counties above mentioned in this State, are thin, ranging from twelve to twenty-two inches thick; therefore these mines can be opened upon this system much more economically than upon that before described. No large pillars for shaft supports are left in. The entire coal is excavated away from the shaft at once, and in every direction in a circle, as evenly and as quickly as possible. Props are set up and pack-walls are put in with the roof brushed down from the entry and room-roads, and as much ground is excavated as possible in every direction before the first break comes on, so as to allow the machine and plant above to settle down as evenly as possible. After the first break is over, and the coal-face all opened up again, but little trouble is had to keep the mine in order if all things are properly attended to and the conditions in the first place were favorable for this system of work.

This system can be seen working to perfection in the mines of the Osage Carbon Co., at Osage City, Peterton and Scranton, and in a few other mines at these places; also in both of the deep mines in Leavenworth county, and in J. H. Ransom's new mine in Franklin county. Every avenue in these mines is direct to the pits of the compass, and is as straight as an arrow. The mines of Leavenworth county have the most favorable conditions of any of the mines in our State for this system of work, and I can say, so far as I know, of any mines in the United States. They have a hard, dry slate roof, which needs very little timbering in the entries generally; a good fire-clay undermining, and a good rock bottom; a good heavy weight above the coal, which breaks it down after it is undermined, and if not properly watched will shell the coal over the mining and make considerable small coal. The mines of Osage, Franklin, Neosho, Coffey and Shawnee counties get the coal out in the largest pieces, making comparatively no slack. In other mines the coal is more or less broken by the time it reaches the railroad cars or pit-tops.

The World's Greatest Telescope.

Passengers out of Boston on the Boston and Albany Railroad may have noticed just across the Charles River, at the first bridge out of the city and opposite Cottage Farm station, a handsome residence, and back of it a low, round-topped observatory, and outside, near it, a long, white model of a telescope, and in the same yard a two-story brick building. The building is the factory where the great Russian telescope was made, as well as many others also famous, and where work is now going on for the Lick telescope, which will be the largest in the world. Of the two disks of glass, each one yard in diameter, for the Lick telescope, the flint glass has been made a long time, but the crown glass, although ordered five years ago, was only received by the Clarks in September last. It was made, after repeated trials and failures, at an establishment near Paris, the only one that could get out such a piece of work. Each glass cost \$25,000 in the rough, and they cannot be finished before Fall. At first machinery could do a little rough grinding, but for months the bare hand only has been used in applying the polishing substance, which is rough. The glasses have reached a stage where the removal of a small portion of the surface in the wrong place would ruin them. They are frequently tested, set in a circular iron frame called a cell. No instruments can be used for the test, but the long experience of the Clarks has given them a judgment which is unerring. Very soon the tests will be made in the model of the telescope outside the building. This model is of the size of the proposed Lick telescope, and is fifty-seven feet long. These two lenses are set six inches apart in their iron frame, which has openings to allow of the glasses being properly cleaned on each side. The lenses and frames together weigh over 700 pounds. While everything now appears to be perfect, some slight defect in the glass that has not yet appeared, or an accident may render useless all the labor of months. When completed the great telescope will be placed in the observatory on Mount Hamilton, in Santa Clara county, Cal. James Lick left \$700,000 in his will for the purpose of constructing the necessary buildings and "for a telescope superior to and more powerful than any yet made." An astronomer has stated that this telescope will bring the moon, 250,000 miles distant, within apparently 100 miles of the beholder. It will cost \$60,000, and will be covered by steel some seventy-five feet in diameter, weighing ninety-five tons. Besides the observatory are many other buildings, containing all the valuable instruments necessary for a complete establishment to carry out Mr. Lick's intentions. The citizens of Santa Clara county have built a road to the summit of the mountain at a cost of \$75,000.—*Hartford Post.*

Chicago.

From the Industrial World.

The conditions of last week's market are substantially repeated. The inquiry from the country is inclined, perhaps, to be a little more general, and a few round transactions have resulted. All sales, however, continue to be for immediate wants, and the indisposition of the buyer to contract ahead is still manifest. Values have not as yet gained any particular strength, though perhaps they are becoming more settled. Arrivals of coal have been about average. Lake freights are dull at 65 cents from Buffalo, and 60 cents from Cleveland.

Anthracite is picking up slightly in demand, and a fair amount of business is doing. The dealers look with considerable interest for the result of the meeting of the men being held here in New York, as it is expected that some advance in prices will follow. The receipts are fairly liberal without being excessive. Card prices are still being more or less shaded.

Soft coals are in middling request only and exhibit no new feature. Values are nominal and the cutting of card rates is still indulged in.

Cannel coal is quiet, and old prices are repeated. The receipts of coke are fully up to the average, and the demand is good for the season.

Charcoal is quiet and unchanged.

We quote as follows:

ANTHRACITE.	
Per gross ton by carload, 2240 lbs	
Grate.....	\$ 5 60
Egg.....	5 60
Stove.....	5 88
Nut.....	5 88
Lehigh Lump.....	7 00
Per net ton by carload.	
Grate.....	\$ 5 00
Egg.....	5 00
Stove.....	5 25
Nut.....	5 25
Lehigh Lump.....	6 25
BITUMINOUS.	
Erie & Briarhill.....	\$4 15
Pittsburg.....	3 20
Indiana Block.....	2 40@2 50
" " Nut.....	1 25@1 35
Baltimore & Ohio.....	1 65@1 80
Hocking Valley.....	2 75@2 90
Rockledge.....	2 75@3 00
Wilmington.....	3 20@3 30
Blossburg.....	2 10
Cumberland Smithing.....	3 25
Sonman Smithing.....	3 25
Grape Creek.....	3 40
Fountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Stinson.....	2 00
Morris.....	2 00
CANNEAL.	
Kanawha.....	4 50
Buckeye.....	4 25
COKE.	
Connellsville Coke.....	5 00
Crushe's Coke.....	5 60
Charcoal, carload per bu.....	8 1/2@8 3/4

PRACTICAL AND THEORETICAL MINING.

QUESTIONS AND ANSWERS PREPARED WITH A VIEW
TO ASSIST APPLICANTS IN

Obtaining Certificates of Competency for the Positions
of Fire Boss, Mine Boss, Mine Inspector,
Etc., Etc., Etc.

BY ROBERT MAUCHLINE, EX-INSPECTOR OF MINES

Entered according to Act of Congress in the year 1885, by J. S. Kirkwood & Co., in the office of the Librarian of Congress, at Washington, D. C.

VENTILATION.

Question 5.—What is the area of an airway passing 16,000 cubic feet per minute, at a velocity of 400 feet per minute?

Ans.—

$$\frac{16,000}{400} = 40,$$

$$\sqrt{40} = 7.07 \text{ feet.}$$

The airway will require to be a fraction over 7 feet wide and 7 feet high.

Ques. 6.—If 2 pounds pressure per foot produce 15,000 cubic feet per minute, how much will the pressure have to be increased to produce 30,000 cubic feet per minute?

Ans.—The amount of pressure required for different volumes of air is proportional not to the volumes but to their squares. To increase the volume from 15 to 30 thousand is to double it. The volumes will therefore be as 1 is to 2, and the pressures will have to be as 1² is to 2². The pressure was 2 pounds, which will have to be increased to

$$2 \times 2 = 4 \text{ times } 2 \text{ or } 8 \text{ pound per foot.}$$

Ques. 7.—If 2 horse-power produce 10,000 cubic feet of air per minute, how many horse-power will be required to produce 30,000 cubic feet per minute?

Ans.—The power necessary for different volumes of air is proportional, not to the volumes, but to their cubes. To increase the volume from 10 to 30 thousand is to treble it or the volumes are as 1 is to 3, the power would therefore require to be as 1³ is to 3³. The power is 2 horse which would have to be increased to 3³ = 27 times 2 or 54 horse-power. This is a startling difference of power, between the production of 10 and 30 thousand feet of air. Two horse-power is equal to

$$2 \times 33,000 = 66,000 \text{ units of work,}$$

which divided by the quantity gives the pressure putting it in motion.

$$\frac{66,000}{10,000} = 6.6$$

pound per square foot of pressure. To produce 3 times the air would require the square of 3 or 9 times the pressure, which would be 3² × 6.6 = 59.4 pounds, per foot for 30,000 feet, and as the pressure in to the quantity is the unit of work, this would be

$$\frac{59.4 \times 30,000}{33,000} = 54$$

horse-power as before. The above shows the reason of this immense difference in the relative power required to move different volumes of air through the workings of a mine. It also shows that the quantity of power given for 10,000 feet is not within the limits of practice, as such questions should always be stated. No ventilating power existing at any mine is able to increase the pressure from 6.6 pounds to 59.4 pounds per square foot. This question was asked by a Board of Examiners.

Ques. 8.—Where would an exhaust fan give the best results, at the top or bottom of a shaft? Would there be any difference in the results and why?

Ans.—If a fan was placed in the bottom of a very deep shaft it would be acting both as an exhaust and a forcing fan. If the colliery was new and the shaft deep the resistance of the upcast through which the fan acted as a blower might be half the resistance of the balance of the mine through which the fan acted as an exhaust, the fan would therefore be $\frac{1}{2}$ a forcing and $\frac{1}{2}$ an exhausting fan.

As far as the mere mechanical effect of the fan is concerned we do not think there is much, if any difference, whether it blows into or exhausts out of a mine, or is placed in the mine to exhaust from one part and blow into another. We are acquainted with fans placed in all the three positions, and the efficiency of the fans in all three cases are practically the same when the different conditions surrounding each are duly considered. The question as to where a fan should be placed, to suit the special conditions of a mine, is a very different problem. The reason that fans are generally placed to exhaust from the mine is that it leaves an open avenue for the air to pass down the shaft or slope, and along the main

roads to the locality where the coal is being mined, thus avoiding the use of doors on the main intake currents, the smoke and gas from the working places being carried off to the fan in return airways, where it will not pass through other working places or come in contact with lights. This argument is more theoretical than practical. If a colliery is supplied with from 75,000 to 100,000 cubic feet of air properly distributed, the return currents will generally be safe with open lights, but the main benefit of the exhaust fan is in keeping the main roads clear of smoke.

One grave objection in our climate, is the formation of ice in the shafts and slopes in Winter. In a wet shaft 100,000 feet per minute of air below the freezing point builds up a mass of ice from every dropper, and causes much danger and expense. Fans blowing into a mine overcome the difficulty of ice in Winter, but the main roads are often smoky if the fan is blowing inward along the gangway. Then main doors are required to disconnect the hoisting shaft, and every trip opening the doors breaks the current. Double doors cannot always be placed sufficient distance apart to properly overcome this difficulty.

Where a fan has to exhaust up a confined compartment of a shaft, by placing the fan at the bottom and using the whole shaft for the upcast reduces the resistance, and increases the volume, but the traffic would have to pass through doors at the bottom, and the amount lost by the opening of the doors might be $\frac{1}{2}$ the gain from the fan. The gain during working hours at least, although at night the fan would give the full benefit in clearing the mine. There are mines where the fan would give the best results by being placed inside but there is one grave objection, especially in gaseous mines.

When placed in the mine, the fan is like the furnace, out of reach of those on the surface when any serious accident occurs.

Fans can and are sometimes placed on the surface to exhaust from a hoisting shaft, by enclosing the landing inside of an air-tight house over the shaft, with the ropes passing through the roof, but the cars have to be passed through double doors or airlocks, the fan being connected with the shaft under the landing. Every car that passes in or out there is some air lost, and generally considerable leakage, but the principal objection is the inconvenience of having a working shaft hemmed inside of an air-tight house. With deep shafts we would prefer this plan to placing the fan at the bottom, where it was necessary to exhaust from a hoisting shaft.

In answer to this question, we think that the difference of result in fans placed at top or bottom of shafts, depends on the conditions existing in the mine, and not on the fan, as a machine imparting motion to the air.

Ques. 9.—With the same power in operation, how can you increase the amount of ventilation in a mine?

Ans.—By splitting up the current into separate sections, by allowing air to leak where the leakage will supply air where it is needed, by inspecting the whole course the air has to travel, and whenever a high velocity is found try to reduce it, by removing obstructions or knocking out old stoppings so as to allow the current to pass through two or three headings instead of one, and drive all air passages as large as is consistent with safety and economy.

Ques. 10.—How would you distribute your air, to give the best results as to the safety of the employees, the quantity and quality of your air in a mine generating large quantities of explosive gases?

Ans.—By distributing the air in separate currents to panels or groups of working places, and always so that the return air would ascend, where ascensional distribution was practicable.

Ques. 11.—Suppose your airways to be 4900 feet in length and you get 12,000 feet of air per minute, would you get more or less air by increasing their lengths 6400 feet? How much more or less?

Ans.—The air volume decreases as the length of the air passage increases but not in the same proportion. If the airways are made longer, without changing their shape or area, then to produce the same quantity the pressure would have to increase as the length, but if the pressure remained constant then the quantity would decrease inversely as the square root of the length, because the volume varies as the square root of the pressure, and the rubbing surface or length is equivalent to the pressure required to overcome it, as long as the speed is not changed by a change of area.

In this question the quantity would be reduced to

$$\sqrt{6400} : \sqrt{4900} :: 12,000 : x \text{ or } 80 : 70 :: 12,000 : 10,500$$

cubic feet by the extension of the airways or in direct proportion to the reciprocal of the square root of their lengths.

Ques. 12.—If your fire boss reported to you that the furnace had been neglected during the night, and that he had discovered large quantities of fire-damp in the workings, what would your method of proceeding be to get out the gas?

Ans.—Break open a connection from the upcast shaft behind the furnace, to the return, by which the gas would reach the upcast without passing through the furnace, and open the door between the downcast and the furnace to admit fresh air direct to the fire before firing up and starting the current. If this was impracticable owing to the location of the furnace, then I would open a stopping just outside of the gas and cause the fresh air from the intake to rush through in volume and allow a small quantity of fire-damp to mix with it, thus working it off slowly by diluting it to a safe mixture to pass the furnace, clearing out one chamber after another,

opening and closing the necessary stoppings in succession. If there was any waste coal could be passed, damp through which the return air could mix the return air from which damp could be drawn to the furnace. I would mix the gas by opening a stopping, and thus damp the gas to make it non-explosive, but on no account attempt to move it in large volumes.

Ques. 13.—Of what material would you construct permanent stoppings or brattices to secure duration and economy? Give reasons in full.

Ans.—Permanent stoppings should not be constructed of timber. They may be cheaper at first, but they soon become leaky from vibration of shots, and soon require repairs and renewal. The great objection is that they are neither fire proof nor strong enough to resist the force of small local explosions, which are apt to occur in even well regulated collieries which give off gas. If hard slate or stone can be obtained from the roof or floor of the mine I would build all permanent stoppings of such, by facing up a wall with the best shaped stones laid in mortar, using a few bricks for special work; then pack behind with stone and debris to give support. Where building material could not be obtained in the mine I would use brick for the walls and support them with packing of any loose debris at hand. Where the coal is always crushing and squeezing as in some of the Anthracite mines, some argue that brick would be crushed, and to carry such heavy material up such steep angles would be very inconvenient. This is partly true, but still any stoppings which would come under the head of permanent, are generally within easy reach of the gangways. Walls built of broad pieces of strong slate laid in mortar stand more crushing than any other material we have seen tried. We know from experience that permanent stoppings should be built of stone or brick or both, as a measure of safety and economy in mines where dangerous gases have to be dealt with, and in fact in all coal mines with which we are acquainted.

Ques. 14.—What are the principal points to be kept in view in hanging doors to assist the ventilation in a mine? State how you could ventilate a mine without the excessive use of doors? Give your methods and reasons fully.

Ans.—The frame of mine doors are stood slightly off the perpendicular, to make them close by gravity, when pushed open they swing back and close except they are blocked. This is required by law, to prevent them from standing open if left so by careless persons neglecting to close them. The main doors should be duplicated, one being fastened back against the wall ready to be closed in case of accident to the other. The frame should be built in with brick and made strong. In the Anthracite coal region the doors are 7 to 8 feet wide and about 10 feet in height. A ventilating pressure of 1 to 3 inch of water-gauge against such a door requires some force to open it, and when allowed to slam shut it soon strains the door, causing it to leak, and require frequent repairs. This cause of annoyance and expense is avoided by double doors placed so far apart, that one is closed behind a trip of cars before the other in front is opened, and the law requires it.

A door 7 or 8 feet wide must be nicely hung so as to swing across a mine track and at the same time fit air-tight on its frame. In some places the gangway is always squeezing and breaking the timber, the bottom heaves up and the sides and top squeeze in. Gangs of men are constantly at work, taking out broken timber, lowering the bottom and putting in new timber. In such places the doors require double doors required. The doors have to be frequently lifted off their hinges and a piece sawed off to make them close, the bottom heaving crushes them out of place. In this case the doors are made in two leafs, which meet in the middle of the track, as this makes them much easier handled and repaired, and not so easily jammed from heaving.

The fewer doors in a mine the better, and although there will always be some doors required for proper distribution, the excessive use of them can be avoided by splitting the current into separate districts and carrying the return air currents over the intake currents by air bridges or overcasts.

(To be Continued.)

IMPORTANT.

When you visit or leave New York City save Baggage, Expressage and \$3 Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot.

613 Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city.

23-1y

SAFETY LAMPS FREE.

Every mine boss should possess a good safety lamp, even if the mine does not give off fire-damp. There is no telling when it will make its appearance, and a safety lamp may be wanted at any moment for purposes of investigation. Any person sending us five new yearly subscribers and the money for the same, can have Williams' improved safety lamp or the Boss' pocket safety lamp sent free.

A correspondent of the *Scientific American*, referring to the several methods adopted for deadening the sound of anvils, suggests the following:—It is advisable to set in lead or sand. I find by setting the anvil on a piece of plank 2 ft. square, and hanging that by the corners to the wall above with small ropes, you will get scarcely any noise and no jar, and the anvil is as solid as if placed upon a block

or any other laws that he pleases, short of the point of producing a general revolt."

According to Mr. George, the coal-miners of Pennsylvania appear to live under conditions but very little better than those of chattel slaves. They are not, however, "what in this country we call peons;" for, as a class, "they are not allowed to run in debt to the company." Mr. George's exact meaning here is best comprehended, perhaps, in the following paragraph.

"Strange it seems when passing through the mining regions of Pennsylvania to come across newspaper articles on *Irish* landlordism or to read resolutions of Knights of Labor denouncing 'land grabbing' in the Far West. If the Pennsylvanian wishes to see land-monopoly, he need cross neither the ocean nor the Mississippi. From many a point in his own State all of the world there is in sight is the legal property of one man or one corporation. All the other 'free and independent' citizens of the commonwealth of Pennsylvania whom one sees there may be cut off at a word from the privilege of earning a living, and be thrown out of what they call their homes at five days notice."

INSPECTORS do not always inspect, any more than professed reformers cure the evils of which they complain most loudly. A six-story brick building in St. Louis collapsed the other night, at a time when it was unoccupied, or it might have been the cause of considerable loss of life. The structure had recently been examined by the building inspector, who pronounced it perfectly safe, yet all at once it fell to pieces like a child's playhouse of cards. It was occupied by hardware dealers, and the disaster is attributed to the placing of a too great weight on the upper floor. The fact remains, however, that its construction must have been faulty. A fair and honest inspection would result in the condemnation of large numbers of buildings in every American city. Cheapness rather than safety is the desire of too many people erecting business and dwelling houses, and until a change is wrought in this particular or a more rigid and effective system of inspection adopted such collapses may be looked for with more or less frequency. Careless construction and disregard of needed precautions to secure safety are the causes of a very large proportion of the destructive fires with which our country is every day scourged, and lead up to an aggregate loss of about one hundred millions of dollars yearly, the greater part of which falls upon the insurance companies. The need for reform in this matter is urgent, and should receive the attention of every one having the good of the country at heart.

TAKING one consideration with another, the lot of the average monarch is not a happy one, and he is neither to be envied in his life or in his death. An English lover of statistics has compiled a statement of the number of sovereigns who, within the historical era, have come to a violent or ignominious end. He finds a record of 2,550 kings or emperors who have reigned over 74 nations. Of these 300 were overthrown, 64 were dethroned, 28 committed suicide, 23 became insane or imbecile, 100 were slain in battle, 123 were captured by the enemy, 25 were tortured to death, 151 were assassinated and 108 were hanged, shot, or decapitated by their subjects. The ratio is little more than one-third of the whole, and in view the cruelty, incapacity, and vice of crowned heads, in all ages and all lands, it is surprisingly small.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, July 31, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	32,352-12	1,150,480-06
Shipped North.....	27,875-00	1,606,679-17
Total.....	60,227-12	2,757,160-03
For corresponding time last year.		
Shipped North.....	45,824-03	1,082,689-08
Shipped South.....	39,215-05	1,294,821-13
Total.....	85,039-08	2,377,511-01
Increase.....		379,649-02
Decrease.....	24,811-16	

Lightning struck an oak in Tippecanoe county, Indiana, and tore it into splinters. It is said that each year's layer of the growth seemed to have been separated from the other, and split into strips about half an inch wide. After completing its work on the oak, the lightning ran thirty yards along a wire fence.

THE FORMATION OF COAL.

A New Theory Regarding the Manner in Which it is Formed.

The *Bulletin de la Ceramique* has lately dealt with a theory regarding coal formation, which it rightly or wrongly considers of sufficient originality to merit treatment of a detailed character, while the facts are said to reconcile various features of the more ancient theories with results obtained by modern experimental science.

Ideas of a more or less novel kind have from time to time been put forward by French writers with regard to this subject. M. Gennette asserted that coal is produced from a certain sandy earth which he names a gas, while M. de Gossanne regards it as clay mixed with sufficient bitumen and sulphur to render it combustible. In further illustration of his theory, he quotes the fact that none of the ligneous products with which we are acquainted can, strictly speaking, be called coal; referring specially to lignites, etc., Buffon has indicated the fact that coal deposits are situated in places which at one time were covered with water. Following out this idea M. de Grand' Eury argues that the water of such seas or lakes was heated by the earth's caloric properties and by the sun. The atmosphere being charged with carbonic acid, there was in these waters an enormous production of inferior vegetation which absorbed the carbonic acid of the air, and became decomposed either by the want of water or of oxygen. A sort of vegetable jelly will thus have been formed which, gradually losing its humidity, transformed its carbon into ulmic hydra-carbureted substances; to become successively transformed into asphalt, petroleum, naphtha, earth pitch, bitumen and finally coal.

This principle is opposed to the idea that large trees and shrubs produced coal, and in further support of this theory it is stated that the carboniferous flora consisted of plants deficient in substances necessary for producing coal, the investigations of M. Gaston de Saporta on this point indicating that this vegetation consisted of a relatively thin circle of wood and a large quantity of a softer substance. Brogniart and Elie de Beaumont attribute the foundation of coal to the transformation of the close herbaceous vegetation which surrounded the larger forest trees and plants. Similar opinions have been expressed by M. Ponchet and others, so that M. Grand' Eury has more or less eminent authorities for his statement, that a calculation of accumulation of trees, etc., necessary for the conversion into even a thin coal bed, a forest suddenly buried under water or gradually letting its residue gather on the ground, leads to an evidently erroneous result; so greatly is it necessary to exaggerate either the mass of vegetable matter or the duration of the process of a coal formation.

Even admitting for a moment that coal is produced by decomposition of trees, M. Grand' Eury asks how can it be maintained that wood, in losing its moisture, has become a liquid. Wood is known to contain a good deal of water, and coal has only traces of it; while he regards it as certain that coal was at one time a liquid, and gradually assumed a solid shape. He considers that coal beds were formerly beds of naphtha and Bituminous petroleum, produced by the decomposition of inferior aquatic vegetation, under the influence of heat and dampness. As a proof of this assertion, he quotes the fact that the porous minerals found at the bottom of coal pits are impregnated in their pores with naphtha and petroleum. This is immediately detected by their odor (particularly with the porous minerals lithoidal carbonate of iron), and it is therefore argued that this naphtha could only have been absorbed during the first state of coal formation. It is further remarked that this theory serves to explain the formation of petroleum, asphalt and other Bituminous springs, which are found at various depths and even at the bottom of some lakes. A porous soil would allow of filtration, and hence M. Fongas has remarked that in calcareous districts the coal found is usually of poor quality.

In further defense of the hypothesis that coal was once in a liquid state, it is urged that canal coal lights in the same way as resin, and can be used like a torch or flambeau. Another proof is the fact that the lighter substances (turfs, lignites, etc.) are on top. Various proofs are furnished by the absence of similarity between the ashes of wood and coal, that the two substances are not so closely connected as has been thought to be the case.

The presence of fossil imprints or plants is explained by the fact that these imprints are in the earthy and schistous portions of the mines, and not in the coal itself. The trunks of trees which are sometimes found are not coal, properly so called, and retain certain properties of wood.

The waters in which there grew the vegetable substances to which reference has been made, contained (like such waters at the present time) carbonate of lime, carbonate of iron, alum and even chloret of sodium (as in the case of the Nicolai mine, Silesia). Hence the presence of these salts in certain kinds of coal is explained.

These interesting facts quoted by M. Paul Noel are possibly not altogether new, but in any case

deserve attention from the methodical and careful manner in which they are presented by him.

Teaching for Hands as Well as for Heads.

During the last thirty days all the colleges, high schools, and other advanced institutions of learning have held their commencements, and thrust their graduates out upon the world. The number of these young persons probably reaches tens of thousands, but of them all, perhaps not two per cent. have learned how to do anything. The education has been of the head alone, and not at all of the hand. They have been taught to know a great many things of greater or less importance, but of the practical work of the world, by means of which men and women earn their bread and butter, they are absolutely ignorant. Much of what the schools impart is certainly useful, and the least important of it may have some value; but it is fairly a subject of complaint against the system of education in use in this country that it is too completely theoretical.

The injurious consequences of this fault appear in several forms. As the country grows industrially, the demand for skilled workmen increases. In the presence of this demand we have, first, the fact that the old and excellent apprentice system has fallen completely into disuse, and, second, the further fact that the modern trades unions are hostile to apprenticeship in any comprehensive form, new or old. It is not the least of the counts against the unions that they stand resolutely in the way of young Americans who wish to acquire knowledge of any craft. As a consequence, we import from Europe every year thousands of skilled workmen, while our own young people are driven into poorly paid clerkships or persuaded to attempt success in the overcrowded professions. It is extremely discreditable to the practical common sense of the American people that they should permit this state of things so long to continue. It is a reflection upon the good judgment of the nation that it should expend millions every year upon instruction which only half fits the young for the actual duties of life.

Another and very serious consequence of this neglect of mechanical training is that it fosters the impression, already too widely prevalent that mechanical labor should involve social and other discredit. Not only is this theory undemocratic, and in a political sense dangerous, but it is directly opposed to the best material interests of individuals and of the whole community. In a republican and industrial country like ours, it ought to be that the most expert handicraftsmen be the man most honored. This is not a land for loafers. It is, in an exceptional and unique sense, the country of workers; and there can be no duty more truly patriotic than to instill into the minds of American young men that a man who works at a mechanical trade with a strong arm and a hard fist, and works dexterously, should have more respect than a lawyer who can hardly shuffle along in his profession or a doctor who feeds graveyards. That lesson, as our readers well know, has yet to be learned here. The prejudice against the horny-handed toiler exists but it ought not to exist, and when the schools and colleges do their duty, it will cease to exist.

We would put into every public school a course of mechanical instruction. Both principles and practice should be taught, so that when a boy leaves school he will have his head and his hands already trained for some form of work in the shop or factory. The colleges might well take up the course of instruction where the humbler schools end it, and push pupils onward to the higher things in the arts. But he is a sanguine man who expects the old collegiate institutions to lessen their affection for dead languages and pure theory. The hope of advanced industrial education therefore lies in the creation of technical schools, of which there are few, but two or three of high quality in the country. There is encouragement in the rapid growth, plainly discernible, of public opinion favoring such schools and such training for the young. This is the greatest manufacturing nation in the world, and as it becomes independent of other countries for its supplies of fabrics, so it should become dependent solely upon its own population for its skilled workers. —*The Textile Record.*

Electric Motors.

A great many machinists' apprentices have been in their day the proud holders of toy steam engines that would "turn over" under steam. Their felicity upon these occasions seems to be fully equalled by that of grown up boys who witness the performance of a new electric motor. Philadelphia papers are jubilant over an electric motor for cars, recently given an alleged trial in that city. It was pronounced a "thorough success" by a large number of "scientists and other distinguished gentlemen," after its ability to move at "nearly eight miles an hour and stop and reverse" had been demonstrated. Seriously, anyone who doubted the ability of an electric motor to do these things must either have a poor opinion of the ability of the inventor, or be a fool. At this time the only thing doubted is the practicability of such a motor to do the work required of it. People would have much more confidence in the ultimate success of any invention in this line if the inventor went quietly on his way demonstrating this important point instead of wasting time in showing the curious that it would "turn over" and "reverse." A number of electric motors have reached this stage during the past five years, and their value seems to be in inverse ratio to the energy displayed in showing them up as playthings. —*American Machinist.*

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Miscellaneous Questions and Answers.

Editor Mining Herald and Colliery Engineer:

- SIR:—Please answer the following questions:
 1. What is meant by "Board Gates" in mining?
 2. What is meant by the term "Battice"?
 3. What is a "Cage" in mining parlance?
 4. What is a "Chock"?
 5. What is the meaning of the term "Course"?
 Respectfully Yours,

LEARNER.

Shamokin, Pa., July 23, 1886.

Answer 1.—Board gates are the gates or roads from which the boards or working places are

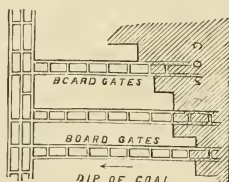


Fig. 1.

opened. The term belongs to Yorkshire, England. The annexed out shows the plan of working as experienced by the term.

Ans. 2.—A division or partition in a shaft, heading, gangway, or other opening in a mine for the purpose of conducting the air currents. A battice may be constructed of stone, brick, sheet iron, plank, boards or cloth. Fig. 2 shows two ways of erecting a battice in any opening underground. Carrying air currents through tubes of sheet iron or square pipes constructed of boards is not called battice, although used for similar purposes.



Fig. 2.

Ans. 3.—The cage is the apparatus upon which the cars are hoisted in a shaft or slope. In shafts the cage slides along guides to keep it steady. In slopes it runs on a track like a railway car. Fig. 3

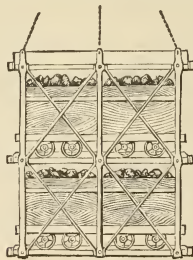


Fig. 3.

shows a cage for hoisting four cars at each winding. Cages are constructed of timber or iron or both, but the newest and best designs for cages are of steel, combining strength and lightness, an important matter in deep mining.

Ans. 4.—Chocks or cribs are square pillars of wood for supporting loose parts of roof. They are



Fig. 4.

constructed of short rectangular blocks of hard wood and filled in the middle with refuse as shown in figure 4.

Ans. 5.—Conducting the ventilation backwards and forwards through the workings by "stoppings" and "regulators." Fig. 5 shows two panels of

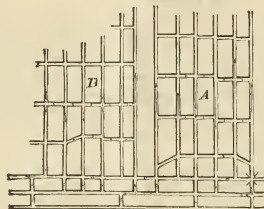


Fig. 5.

board and pillar workings. The side marked "A" shows coursing known as two and two, while the side marked "B" shows coursing known as three and three. The arrows on the plan explain the meaning of the respective terms.

CONTINENTAL COLLIERY NOTES.

Extracts From Papers Written by Geo. E. Andre, F. G. S., M. E., &c., for the "Colliery Guardian" of England.

I have already, and more than once, directed attention to the difficulties with which Belgian coal mining is surrounded. But I do not remember to have pointed out one symptom of decay the full significance of which has not been perceived by those who have lately written on the subject of a probable decline of the Belgian coal raising industry. I allude to the discontinuance, that absolute stoppage of all dead work in the mines not required by the pressing exigencies of present working. All exploratory work has ceased. There is no opening up of new districts; no steps taken to extend the existing workings. There is but a trifling profit—often a loss—on the working in the prepared coal seam. The cost of dead work not absolutely necessary at the moment would convert that profit into a loss, or increase the loss already incurred. Hence it comes that the coal is got at the least possible cost, having regard to present circumstances. But it is easy to see what the consequences of this system of working will be, and to estimate its effects on the industry in the near future. Nothing, perhaps, indicates more clearly its decay, and nothing certainly shows more conclusively the tendency of natural conditions to restrict the production.

The work of improving the navigation of the Seine approaches completion. It is announced that by the month of September the portion of the river between Rouen and Paris will be open to vessels drawing 9 ft. of water. This is a circumstance of great importance to the English coal trade with France. The native coal-owners of the north perceive the advantage which this improved water transport will give to the English importers, and they are loud in their demands for the immediate construction of the proposed Great Northern Canal as a set-off to the greater facilities afforded the foreigner by this deepened water-way.

In these days of sensational journalism, when even scientific writers are led by the influence of the times to strive after paradox, and to attract attention to themselves by a bold denial of some fact or doctrine hitherto regarded as absolute truth, the appearance of a soberly-reasoned article in the pages of a scientific periodical, written to prove that the substitution of mechanical for animate motors is a mistake, and that the invention of machinery does not mark scientific and material progress, will occasion little or no surprise. But those who take up the last number of *La Revue Scientifique* and read to the end M. Andre Sanson's contribution, will lay it down with mixed feelings of disappointment and astonishment. The surprise in this case will be occasioned, not by the writer's attempt to prove a paradox, but by the success he had achieved in that attempt. The disappointment will spring from the recognition of the fact that much of the boasted progress of the nineteenth century, this age of mechanical invention, is after all but imaginary. The appearance of this article is singularly opportune. There never, probably, was a time when economy in production was of greater importance than it is now. How to reduce the prime costs is the question uppermost in the minds, not only of coal and iron masters, but of all manufacturers and producers of the raw material of industry. It is startling, then, to learn, just when we are striving to increase the proportion of machine to hand labor, that we are on the wrong track, and that if we are to beat our rival in this matter of cost, we must return to the use of the primitive means. Of course it is admitted that where great power or high speed is required, the steam engine offers enormous advantages. These are the proper conditions of an im-

animate motor. But it is contended—and the contention is supported by strong evidence—that whenever an animate machine, horse, ox, ass or man can be conveniently employed, the animate machine will work at less cost than the inanimate. The writer cites ploughing as an instance in agricultural work, tramways as an example of goods and passenger conveyance, and shows by figures—which must, I think, be accepted—that horse power is in those cases considerably cheaper than steam power. There is much in this question worthy of serious thought, for it may be that in many directions we are, from the economical point of view, pushing machine labor too far. Unfortunately, the question is complicated with other considerations. The attitude of labor to capital has alarmed employers into seeking a way of escape from harassing conflicts in the use of labor saving machines. This, with other equally cogent reasons, may prevail in the old countries, but in the new the claims of "animate labor" may obtain a favorable hearing. M. Sanson's article is worthy of attentive perusal, if only for the sake of the information which he adduces as evidence in support of his views.

A Mr. Mayer is making some noise just now with a system of tamping for blasting shots in coal. The main object of his invention is to prevent the blowing-out of shots—an occurrence known to be dangerous in fiery or dusty mines. Mr. Mayer's tamping material—which he calls *clodeine*—consists of the ordinary substances used for that purpose mixed with a quick-setting cement. He asserts that his *clodeine* sets hard in a few minutes, and adheres so firmly to the sides of the borehole that it cannot be blown out. This invention reminds me of some experiments I witnessed some three or four years ago in one of the Westphalian collieries. In the experiments, the "bore-meal" from the shot-hole was mixed with plaster of Paris, and the compound was wetted before being pushed down the hole. The plaster set in a few minutes; but there was never much adhesion to the sides of the borehole. Later on, Roman cement was mixed with the plaster, and in some cases used alone with the tamping material. This kind of tamping was certainly more resisting than the ordinary kinds. But the difference was not great and the system was abandoned as not being worth the trouble it involved. For anything I know, Mr. Mayer's cement may give better results.

How the English Miner Used to Amuse Himself.

"Ten years ago," says a correspondent of a London paper, "I happened to be at Byerly Hill, and an invited guest of a rural fete, called a *Blinks*, given entirely by the miners.

"Women as well as lads attended, and although on a moderate estimate each one of them must have consumed at least four shillings' worth of intoxicating liquor, the value of the gowns that each wore was not half the money. Among the amusements was a dog-fight in a distant corner of the field, where women were as free as their husbands to back a favorite pup for a shilling; a man fight; and—a sight, thank Heaven, I never witnessed before or since—a woman fight; a regular strip-to-the-waist, stand up-set-to, the backer on one side being the husband, and on the other side a noble-minded swain, the accepted suitor of the pugilistic maid who was the married woman's antagonist. If I remember rightly, at the elevation round the maiden Amazon, by shoulder hit full at the other's breast, caused such a sudden and prolonged fainting fit that she was unable to come up to the scratch when time was called, and despite her husband's strenuous endeavor to 'bring-to' the wife of his bosom by bending her thumbs and applying a pinch of strong snuff to her inanimate nostrils, the sponge was thrown up. To be sure the stakes were only a quart of run, and it was some consolation to observe that a quarter of an hour afterward the parties concerned were all partaking of it as amicably as possible, but it was an ugly sight and one to be remembered."

Matters seem, however, to-day, according to the same authority, to have much improved. From the extreme barbarity of ten years ago, they have lapsed to-day into quite a fair amount of civilization, the men wearing glazed leather boots without any stockings on, but behaving themselves in an orderly way, fighting being entirely excluded from the pastime. Speaking of the appearance of the men, the same writer says:

"Over and over again a score of times I raised had a disconcerting stab or finger, sometimes two, gone, while men with only one eye were as common as among us are men who wear spectacles. Nor was this all. Of their whole number, one in ten at least, bore on his face blue scars of powder blasting, and some were disfigured with jagged and deep scars extending from brow to chin. And nearly all are stunted, and have round shoulders and wan faces, and that shy blinking gaze that invariably distinguishes men who labor in semi-darkness."

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

A DUTCH SUCCESS IN CO-OPERATION.

An Interesting Article by Alfred Bishop Mason in the "Century Magazine."

There is no undue boast in the title of the book, "*La Question Ouvrière, Essai de Solution Pratique*," in which the story of this co-operative distillery is told by its creator and managing director, Mr. J. C. Van Marken, Jr. What I have to say of the enterprise has been learned from his lips as well as his book; and the testimony of both was confirmed by my own eyes when I made a pilgrimage to Delft, not long ago.

The factory began work in 1870. It is owned by a joint-stock corporation, so that Mr. Van Marken has had to make his co-operative schemes not only alluring to his workmen but profitable to his fellow-shareholders. In 1874 the first dividend was paid on the capital stock of \$84,000. It was less than six per cent. In 1877 the dividend was thirteen per cent.; in 1879, twenty-four per cent.; in 1880, thirty-six per cent. upon a doubled capital of \$168,000. During 1880 the profits set apart for the laborers amounted to six and a half per cent., so that the total net earnings of 1880 were forty-two and a half per cent. on the capital invested. I give these figures to show that the business has been carried on upon a business basis, for profit and not for philanthropy.

This factory lets its employes buy, in small installments, a minority interest in its stock. It supplies them, or rather (and more wisely) it aids them to supply themselves, with good doctors and pure drugs at cost. It began to teach them about "first aid to the injured" a year or more before such teaching was offered in New York. It sells them fire insurance at cost; and the cost is 12½ cents per \$100 per annum, payable in quarterly installments. It has given their children a gymnasium. It has built some model tenements for them. Lately it was laying out a small park for them.

The company has established a system of premiums, which is intended to "interest labor in increasing the yield from the raw materials used." The average yield of alcohol and yeast from a given quantity of grain prior to 1874 was fixed in that year as a minimum. It was determined to divide among the workmen each week, in proportion to their wages, about one-third of the value of any increase. If the yield in any week fell below the fixed minimum, this deficiency was to be deducted from the surplus of subsequent weeks. The results of this system are thus stated: "The percentage of yield from the raw materials is not surpassed, so far as I know, in any other similar establishment." The consequent premiums increased wages about ten per cent. in 1875 and about thirty per cent. in 1880.

There is a system of rewards, which is intended to "interest labor in the reduction of the general cost of production by limiting the number of laborers." In 1878 the number of men needed to work a certain amount of grain was fixed. A reward was offered for each extra thousand kilos of grain worked per week by this number of laborers. This reward is a small percentage of the gain. The result has been that forty-three workmen now do twice the work formerly done by thirty-nine, and earn forty-five per cent. more wages.

There is a "participation in profits, interesting labor in the net result of its toil." From the profits of each year a five per cent. dividend is paid. The surplus is divided about as follows: ten per cent. of it goes to the reserve fund, fifty per cent. to the stockholders, ten per cent. to the executive committee and twenty per cent. to the managing director and ten per cent. to the executive committee and the managing director in trust for the operatives. These trust funds are devoted to the purchase of annuities. An amount equal to seven per cent. of each laborer's wages buys him a fixed annuity, payable to him from his sixtieth year. An employe whose labors in a factory begin when he is twenty and continue till he is sixty will thereafter receive an annuity about equal to the average of his wages during that time. If the percentage of profits fails to pay the sum due in any year, there is no forfeiture of rights already gained, for a separate annuity is bought each year. The only result is to diminish the aggregate by the amount which would otherwise have been bought that year. Workmen who are employed less than two years, or who are discharged for misconduct, lose their annuity rights. Those discharged for any other reason retain only a part of their annuity rights. This annuity system was introduced in 1880. The profits of that year permitted the purchase of annuities for all the workmen then in the company's employ, not only for that twelvemonth, but for each year of their employment before the system was introduced. This is at once the most novel and the most valuable of all Mr. Van Marken's plans.

Plans for general accident insurance are in preparation. Since the barbarous doctrine that an employer is not liable for a hurt to an employe caused by the fault of a fellow-employe has ceased to be

law in England, companies have been formed there to insure employers against such liabilities. Mr. Van Marken's plan seems somewhat better.

When the ten per cent. of net profits above the fixed dividend on capital becomes more than sufficient to pay for the annuities already mentioned, the surplus is to be devoted to the purchase of life insurance.

There is a council called "The Nucleus." It is composed of the managing director, the heads of departments, the foremen, and three laborers. The last are elected annually by their fellows. This body meets once a week to discuss matters of general interest pertaining to the whole enterprise. Its functions are purely advisory.

In every department of the factory there is a box with numbered compartments. Each employe has a corresponding number. Money can be dropped into any compartment at any time. The boxes are secured by two locks. The foreman has one of the keys, the managing director the other. Every Wednesday morning (wages are paid Tuesday afternoon) the boxes are opened and the sums found in them are credited to the several depositors. Interest is paid at five per cent. per annum, and a bonus of five per cent. is credited for each florin deposited. Deposits may be withdrawn at any time. After any withdrawal, in whole or part, no bonus is given until the deposit exceeds the total credit at the time of withdrawal. The five per cent. bonus comes from the funds of the "Bank for the General Good." This attempt to encourage saving has been only moderately successful. In 1881, after a ten years' trial, the total deposits were less than two thousand dollars. Mr. Van Marken attributes this partly to the existence of his obligatory savings institution, and partly to the reluctance of his employes to let him know how much they can save, a reluctance due to their fear that their wages may be reduced.

The premiums already mentioned are paid wholly in cash only to married workmen who have four children less than fifteen years of age. The other cash payments are as follows:

90 per cent.	to married men with 3 children below 15.
80 " "	" " " " " " " " 2 child " "
70 " "	" " " " " " " " 1 child " "
60 " "	" " " " " " " " without children.
50 " "	" " " " " " " " unmarried men above 23.
25 " "	" " " " " " " " between 18 and 23.
10 " "	" " " " " " " " below 18.

The balances are credited to the owners and draw for per cent. interest. Neither principal nor interest can be withdrawn before the depositor is sixty years of age, unless (1) he ceases to be employed; (2) he is married, when he can draw upon his deposit to an amount equal to twenty-five days' pay; (3) his wife is confined, when he can draw an amount equal to two days' pay; (4) he satisfies the managing director of the advisability of permitting him to withdraw all or part of his deposit. This system of enforced saving began January 1, 1879. Up to June 1, 1881, one hundred and seven persons had had credit amounting to nearly \$4500, and had withdrawn about \$2700, half of it to buy stock in the corporation.

From the part of the premiums nominally payable in cash, according to the table already given a deduction of ten per cent. is made. The funds thus realized are paid into the "Bank for the General Good," and are disbursed by the managing director as he deems best for the general good. These funds have so far sufficed to found and maintain the club-house, the library, and the gymnasium, and to pay the five per cent. bonus upon voluntary savings, etc.

There are reading and recreation rooms in a pretty little building between the factory and the workers' home. It is really a club-house, open from five to ten p. m. to the operatives, their wives, and their children above the age of sixteen. There are billiards and cards, chess and dominoes, stereoscopic views and engravings. Pictures and the diplomas awarded the factory for the excellence of its products adorn the walls, below the truth-telling motto, "The factory for each; all for the factory." The rooms are also opened on Sunday from two to ten p. m.

A library of eight hundred volumes occupies part of the club-house. It is free to the workpeople and their families, and circulates on an average one hundred and sixty volumes per week. It was founded in 1871. For the first years the books were kept in Mr. Van Marken's house. Nobody applied for them. In 1878, when they were transferred to the club-house and put in charge of an operative, the whole force apparently began to read.

Literary and scientific lectures are given in the reading-room during the Winter to audiences of twenty or thirty persons. Sunday-evening readings of prose and poetry draw about fifty people. The display of the magic-lantern, which is the newest treasure of the club-house, always fills the hall.

Festivals are held several times a year. The opening of an addition to the factory, the birthday of the director, a successful year,—such events are celebrated together by master and men. Any workman who wishes to do so can have his child's name entered on the company's prize books. The child's teachers then make regular reports of the pupil's progress. Prizes of three or four cents are given each month to all the children who reach a certain grade. These sums are deposited to their credit in the saving-bank, and cannot be withdrawn till the end of the year. There are festivals for the children each Summer and Winter. At the Winter celebration special prizes are distributed. The children are notable in the Delft school for punctuality, for regularity of attendance, for zeal in study.

I have sketched as briefly as might be the story of a great success. The success is born of the brain of an enthusiast, but his enthusiasm pays dividends, and his book shows less able men how they can make co-operation successful. Any one who cares to do so can find the story told with a myriad detail in Mr. Van Marken's book.—*Alfred Bishop Mason.*

Engine-room Ventilation.

That any place is good enough for an engine, and that the engineer does not need the same light and air that his fellow-workmen at the tools require, is a doctrine that seems pretty thoroughly inculcated into the constructive practice of our city factories, and those of the country, too, for that matter. It is based probably upon this fact, that an engineer can keep up steam and can keep his engine at work in a dark stokehole, whereas the lathe hand cannot do his delicate work without plenty of daylight. So the engine is put in the cellar or in some dark corner of the building, and the man in charge left to live and breathe as best he may. Taking it for granted that the location must be where it is, we must try and make the place as healthful as possible.

If the place is at the foot of a well or in a dark corner of the building, the room may be brightened and lightened by coating the walls of the room and the outside of the buildings opposite the windows with whitewash, by cleaning the windows and enlarging the scuttles if the engine is in the cellar. After this has been done, the supply of fresh air should be looked to. It is too often the case that the first and engine-rooms are like hot stifling ovens, and the man in charge must necessarily be enervated by his work. That there is no need of this is evidenced by the fact that in the stokehole of steamers, where the men are closely confined below the water line, a system of ventilation keeps the air pure and the temperature lower than that of any other portion of the steamer. This system may not be practical for factories except in rare instances, yet the same result may be produced. It is seldom that an engine-room is so located that no direct communication with the outside is possible. What we would recommend is that a circular opening be made to the outside, and in it a screw fan be placed. This fan may be made by the engineer of sheet iron, and mounted on a shaft running in wooden bearings, and driven by a belt led off from the shafting. This will make a rude ventilator, and the engineer will find the time and money well expended in the diminution of fatigue, if he cannot prevail upon the proprietor to do it for him. If the room is not next to the outside wall, the same device may be used with the addition of a tin pipe or conduit to the wall.

We have seen this tried very effectively in hot and stifling rooms, and would recommend those who are sweltering in such places to use their wits and make some adaptation of this kind to the bettering of their physical condition.—*Power.*

Pittsburg.

From the American Manufacturer

There have been frequent showers during the week, and at least one hard rain, but they have not been wide-spread enough to produce much effect upon the rivers. The Ohio was swelled a little and a few empty craft that were not far below the city were enabled to get into port, but that was all. Mining along the Monongahela is still almost entirely suspended. The usual annual repairs and improvements are being made at the mines, which occupy from two to four weeks. Owing to the continued suspension of navigation prices at Cincinnati and Louisville are a little higher, and we change our quotations accordingly. At the railway mines there is no noteworthy change. We quote as follows:

PRICES AT PITTSBURGH.

River, wholesale, on board.....3½@4½ cts. per bushel.
Railroad.....4¼@4½ cts. per bushel.

AT CINCINNATI.

River wholesale, on board.....5½@6½ cts. per bushel.

AT LOUISVILLE.

River, wholesale, board.....5½@6½ cts. per bushel.

AT NEW ORLEANS.

River, wholesale, on board.....25½@26½ cts. per bbl.

Bushels are rated among dealers here at 76 lb.—26½ bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lb. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Cornellsville Coke.—All the ovens continue busy, and all features are about as they were last week: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

A new gun invented by Norman Ward, is being cast at the Scott foundry at Reading, Pa. It is a breech-loading chambered 12-inch combined rifle and smooth bore. It is proposed when completed to take it to Washington, where it will be fired thirty times an hour, with a charge of 300 pounds of powder and a projectile of 600 pounds weight, with an initial velocity of 2,000 feet per second. In this proposed test 9,000 pounds of powder will be consumed in an hour.

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F. M. Co. Box 115, Newport, Ky.

12 miles from Philadelphia. Fixed price covers every expense, even books, &c. No extra charges. No incidental expenses. No examination for admission. Twelve experienced teachers. Special attention given to the sciences. Opportunities for apt students to advance rapidly. Special drill for dull and backward students. Boys or girls may attend. Students may choose the regular English, Scientific, Business, Classical or Civil Engineering courses. Tuition, \$100.00. Board, \$10.00. For Harvard, Yale, Princeton and ten other Colleges and Polytechnic Schools. 10 students sent to college in 1881, 15 in 1882, 18 in 1883, 10 in 1884. Graduates, 1881-1885, 100. Graduates, 1886-1890, 124. Graduating class every year in the fields of Mechanical Engineering, A. Physical and Chemical Laboratory, Gymnasium and Ball Grounds. 1200 ft. of land. 1000 ft. of water. 1000 ft. of apparatus doubled in 1883. Media has seven churches and a temperance charter which reads: "No saloons, no gambling, no dancing." For new illustrated circular address the Principal and Proprietor, SWITHIN C. SHORT, LIME, A. M., Harvard Graduate, 1884, PENNSYLVANIA, 1894.

AMONG INDUSTRIALS.

WHAT THEY ARE DOING IN DEVELOPING THE NATIONAL WEALTH.

The Miners' Association of Streator, Ill., is going into politics and will run a candidate for assembly.

The international Axe and Edge Tool Makers' Union is now an assembly of the Knights of Labor. The new trade district assembly contains 7,000 members.

The checkweighman question is likely to cause trouble around the Baltimore and Ohio railroad.

The Southwest Coal Company's mines at Buena Vista have closed down for six weeks for repairs.

The coal in the Sioux reservation known to exist would solve the fuel problem for central Dakota.

The Nehalem Coal Company, of Portland, Oregon, has been incorporated, with a capital stock of \$100,000.

The Ottumwa and Northwestern Road has been incorporated in Iowa. It is to develop extended coal deposits.

The second annual convention of the National Federation of Miners and Mine Laborers will be held this year at Indianapolis, September 7th.

The picnic and labor demonstration, in Scotland, Pa., on the 14th inst., according to the estimate of the managers, will be attended by about 10,000 people.

Secretary Davis, of the State Miners' Association, says the published statement of anarchy spreading in the Connellsville region is false.

The total depth of the new shaft being sunk by the Pennsylvania Coal Co., near Gypsy Grove Colliery, Dunmore, is 234 feet. The second vein has just been penetrated. Sixty-five feet further down, or about 300 feet from the surface, the sinkers expect to reach the bottom of the lower vein.—*Truth.*

There is considerable excitement over the new coal mines discovered on the Colorado river, Texas, twenty-five miles north of Brady, and twenty miles southwest of Santa Anna. A four-foot vein of solid coal is now being worked.

Cincinnati bricklayers are locked out by the contractors, because they could not run their employers' business affairs.

At Elk Lick, Pa., work is reported very scarce.

Work in the Frostburg mines is not as good as last month. The Consolidation company has secured the contract to furnish the Western Maryland Railroad with coal. Many men are idle who have not been returned to work since the strike.

The Lonaconing (Md.) Review publishes in full the rules governing the employees of the Northern Pacific Coal Company, of Montana. They are numerous and those who obey them have to do the work cheaply.

The Cleveland street railroad companies are blacklisting all employees who have ought to do with labor organizations.

Vice President and Superintendent Moore, of the Vale (N. S.) Coal and Iron Company, was lately cabled by his employees, not because of any infirmity of step but as a token of appreciation.

The Indianapolis steel rail mill, which has been idle for several years, is to resume operations. Its former capacity will be doubled and 300 or 400 men employed.

Wilkes-Barre Business College.

Mr. Frederick Schneider, the book-keeper of one of the large coal corporations in Wilkes-Barre, and a remarkable accountant, has been conducting a business night school in Brown's building for some time and with success. He has now associated with a faculty and will teach business, mathematics, English branches, penmanship, commercial law, geography and typewriting. He will open a regular business college in the Wyoming National Bank on the 30th of August next, and students may enter then, or at any time, and remain as long as they wish, and pursue such branches as they desire. His detailed plan of proceeding will appear in the form of an advertisement in a few days. The institution will doubtless develop into an important business college.

In Holland, Me., C. J. Doesbury publishes the *News*, and in its columns strongly recommends Dr. Thomas' Electric Oil for coughs, colds, sore throats, catarrh and asthma.

VARIED TOPICS.

Ristori is writing her memoirs.

A chemist has discovered an extract from coal tar 230 times sweeter than sugar.

It is thought that a dozen shots from the new German bomb, charged with dynamite shells, would destroy the strongest fortifications in the world.

The French Revue Botanique announces a sure agent for the destruction of the Mildew (*Peronospora viticola*), which is the chief scourge of vineyards over large areas in the United States. This agent is sulphate of copper.

J. H. Wishek started on horseback to take a day's journey in McIntosh county, Dakota. A blizzard swooped down on him, he lost his way, and stood behind his horse all night, and when his pistol kept off a pack of prairie wolves. When day broke he found that he was within a few hundred yards of the house he was seeking.

The general detailed map of the United States, proposed and already begun by the Geological Survey, will be upon the scale of about forty miles to the inch, with contour lines for every 25 to 200 feet, according to the nature of the topography. It is proposed to issue this map in atlas sheets, each composed of one degree of latitude by one of longitude, bounded by parallels and meridians.

The population of London now exceeds every other city, ancient or modern in the world. New York and all its adjacent cities combined are not equal to two-thirds of it. Scotland, Switzerland, and the Australian colonies each contains fewer souls, than Norway, Servia, Greece and Denmark have scarcely half so many. Yet at the beginning of the present century the population of all London did not reach one million.

James R. Miller, of Camden county, Mo., was bitten by a dog that he thought was mad. He at once set out for Boonville where he had heard that there was a madstone. A Mr. Bacon had one, and it was applied to the wound, to which it readily adhered for a time. When it fell off, he was washed in warm water and then applied again. This was done three times, and then the stone would cling no more. Mr. Miller had a wound on his hand made the same day on which the dog bit him. The stone would not adhere to this at all.

The Empress of Austria's taste for field sports is by no means exceptional among ladies of rank in Austria and Hungary. A little while ago the Crown Princess accompanied her husband on a shooting expedition, and proved herself to be an excellent shot. The imperial hunts in Hungary are always frequented by a number of ladies belonging to the higher court circles. As a matter of fact, the predilection of the Empress for hunting is fully shared by the ladies of the Austro-Hungarian aristocracy.

Mr. and Mrs. William C. Rumsey of St. Louis did not live very happily together. He was jealous and she was quick tempered, and they disagreed continually. Often she would try to bring about a better state of affairs, and one day made an unusually strong effort to effect a reconciliation. At last he parted from her with words of affection, telling her to be sure and be home at 4 o'clock that afternoon, when he would send her something nice. She was very happy and stayed at home anxiously waiting for the present. It came promptly on time, and proved to be a copy of the petition for a divorce filed that morning by her husband.

Against Silk Culture.

Everybody's silk worms do not prosper and one woman, who has evidently been very unlucky, writes to the Chicago Inter-Ocean: Had I a pen of fire, and the sky for a scroll, and could I fly on the wings of the wind I would at once start on my 'mission of mercy,' and soaring through space in my blue Susan-nahana to the far Pacific, I would inscribe in my flight in burning letters across our land, 'Let silk culture be most severely alone.' I know whereof I speak, I tried it to perfection under the most auspicious and exceptionally favorable circumstances—the cry of means and appliances at hand for 'clearing' \$8.00 in the six weeks required to attend to 'crop.' Within 30 miles of a market for the cocoons, with every surrounding the most encouraging my hops were high—but it was a dead loss of time and money and work. It all ended in just 45 cents worth of cocoons!

I know how plausible it looks and reads I know the inducements held out by silk culture associations. I know, too, that the whole thing is as empty as a last year's bird nest, and I who have been so severely 'burned,' would find caution others about going near the fire.

A MAN'S THREE MEALS.

Some Common-sense Suggestions About Food in Its Relation to Health.

Yes, breakfast ought to be a hearty one, eaten early in the morning, and eaten slowly, so as to preclude the possibility of eating too heavily, which would materially interfere with the business of the day. A man or woman who is no breakfast eater must either be a heavy—over-heavy—supper eater, or be in a bad state of health. A person who requires the stimulus of a cup of tea, or any other stimulus or stimulant whatever, before partaking of food, is hampered in the heyday of health, I like to see a man have his breakfast first, and then feel round for his cup of coffee, tea or chocolate. I have known the strongest and healthiest of men positively forget all about the liquid part of their breakfast and leave the table without it. I have known men who scarcely ever touched a drop of liquid of any kind from one week's end to the another, and who, nevertheless, were in ruddy and robust health. What a person eats for breakfast often gives me a clue to the state of his health. One example: If, while sojourning at a hotel, I see a man come down to breakfast between 10 and 11 o'clock, and sit down to deviled kidneys with plenty of sauce (piquant), and perhaps one poor puny egg to follow, I would be willing to aver that he carries a white tongue and that his liver sadly needs seeing to. Ham and eggs, bacon and eggs, or a beefsteak or underdone chop, with boiled eggs to follow, and then a cup of nice tea, is a sensible breakfast for a man who is going away into the fresh air to walk, or ride, or work till noon, but not for a person who has to sit all day in the same position at manual labor. I emphasize the word manual because intellectual or mental work conduces to appetite. An author hard at his desk, if his ideas are flowing freely, will be happy at his work, and time flying swiftly with him, soon gets hungry, which only proves that we must support the body well when there is a strain upon the mind, so that no extra expenditure of tissue may lead to debility. Cheerful conversation insures the easy digestion of a good breakfast. It is a pity that in this country the custom of inviting friends to a maternal meal is not more prevalent. I may seem a strange thing to say, but I would be happy to see his work, and time flying swiftly with him, soon gets hungry, which only proves that we must support the body well when there is a strain upon the mind, so that no extra expenditure of tissue may lead to debility. Cheerful conversation insures the easy digestion of a good breakfast. It is a pity that in this country the custom of inviting friends to a maternal meal is not more prevalent. 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HIGH DUTY PUMPING ENGINE.

Important Improvements Recently made in the Worthington Duplex Pump.

The value of a pumping-engine is to be measured by several elements. Moderate first cost; simplicity of construction, which involves ease of management and cheapness of repairs; reliability; and economy in the consumption of fuel, which is commonly called high duty. An engine that on a spurt under favorable conditions can attain a high duty may yet be an undesirable machine in other respects. For this reason, the simplicity and low cost of the direct-acting steam-pump have given it the preference over the higher duty Cornish pumps, so expensive in construction and foundation.

It has been long sought for the simple direct-acting pump the high duty of the more expensive machine, and a great step in that direction was made by using both a high and low-pressure steam-cylinder, as is done in the Worthington duplex pump, which has long been held in very high esteem; but progress is an attribute of the American engineer, who can not help always aiming at better results, however satisfactory those already achieved. The late Mr. Henry R. Worthington perfected the duplex pump, and his son and worthy successor, Mr. C. C. Worthington, adds to it a very simple and ingenious device, by which the duty of the duplex pump is increased from 40 to 60 per cent, and attains the very first rank among high-duty engines.

This important improvement, Mr. Worthington well says, marks a most important and radical advance in the position of the direct-acting engine. Instead of the engine being confined, as heretofore, to an expansion of steam due to the relative areas of the cylinders, it can now be run at such ratio as is found to be the most economical. In other words, any point of cut-off in its cylinders may be used.

It consists of two small oscillating cylinders attached to an extension of the plunger-rod of the engine, preferably beyond the water end. These cylinders and their connecting pipes are filled with water or other liquid. Compressed air from a storage tank is admitted at a suitable pressure, to maintain a constant load upon the pistons in the cylinders, through the medium of the interposed water. These pistons act in such a way, with respect to the motion of the engine, as to resist its advance at the beginning of the stroke, and assist it at the end, the air meanwhile exerting its unvarying pressure at each point of the stroke.

The two cylinders act in concert, and, being placed directly opposite each other, relieve the cross-head to which they are attached of any sliding frictional resistance, and the engine of any lateral strain.

By thus alternately taking up and exerting power through the difference in the angle at which their force is applied with respect to the line of motion of the plunger-rod, these two cylinders in effect perform the functions of a fly-wheel, but with the important mechanical difference that they utilize the constant pressure of compressed air instead of the energy of momentum. Their action is readily controlled, and their power cannot only be exactly proportioned to the work to be overcome, but is entirely unaffected by the speed of the engine. The same amount of expansion can be obtained in the same engine, whether running at a piston speed of ten feet per minute or at one hundred and fifty. This latter feature is one of great importance, affecting as it does so favorably the economy of the engine, when applied on any service where the demand is irregular or intermittent. Where such service is performed by a fly-wheel engine, it is a well-known fact that the best economic results are attained only when the engine is running at nearly its full-rated capacity, and its economy rapidly falls as its speed is decreased. With every change in the rate of rotation of the fly-wheel, a corresponding change in the point of cut off must be made. When the speed is decreased, the steam must be made to follow farther in the stroke of the piston, thus reducing the expansion and consequently the efficiency of the engine.

The work of the compensating cylinders can, at the will of the attendant, be thrown on or off the engine instantaneously. Should they or the cut-off mechanism become in any way disarranged, or require overhauling or repairs, they can be quickly disconnected from the engine, which can then be run as economically and satisfactorily as though originally constructed without them.

In a modification of the above-described method of securing pressure in the compensating cylinders, the pressure in the force-main is made to produce it through the medium of a differential accumulator. This modification is especially applicable to an engine running on the direct pressure system of water supply, or on any service where the resistance on the engine is subject to sudden variation. With it, the engine adapts itself exactly to the load; the pressure in the compensating cylinder varying proportionally with the pressure in the force-main, resulting in a uniform propulsion on the water column

and an absolute control of the speed of the engine, without dependence being placed upon any auxiliary governor or other complicated device. Should the force-main or distributing-pipes burst from any cause, no accident could occur to the engine itself, as the loss of pressure in the main would result in a corresponding loss of power in the compensating cylinders, and should the pressure be entirely withdrawn from them, the engine would be unable to complete its strokes.

Where the most economic results are desired, the expanding as well as the high-pressure cylinders on the engine are provided with cut-off valves. These consist of semi-rotating plug-valves placed in the admission ports of the cylinders, and operated by means of the direct connections illustrated in the engravings. As will be seen, their action is secured without the use of any eccentrics, gears, or cams. When the point of cut-off has been once fixed, it need never be altered.

Worthington engines with this attachment have been fully tested under all the conditions to be met with in actual practice, and have achieved as high a duty as has heretofore been secured by an engine of any other type. A duty of one hundred million foot-pounds with the consumption of one hundred pounds of coal has been considerably exceeded with an engine developing less than one hundred horsepower, and with boilers evaporating ten pounds of water with each pound of coal.

Worthington high-duty pumping engines have been furnished, or are in process of construction, for the following pumping stations:

New Bedford, Mass.....	Cont. capae,	5,000,000 gals. in 1 day.
Gravesend, R. I.....	"	2,000,000
Abington & Rockland, Mass " "	"	2,000,000
Montreal, Prov. of Quebec, Can.....	"	12,000,000
Jersey City, N. J.....	"	5,000,000

The New Bedford engine was recently tested and the following is a copy of the preliminary report of the experts:

HENRY R. WORTHINGTON, New York:

SIR: The engine recently constructed by you for the New Bedford Water Works, tested yesterday to a duty test for the period of twelve hours, in accordance with the requirements of the contract.

The average speed of the plungers was about 94 feet a minute. The average head, including suction, was 137.78 feet. The water delivered was ascertained by plunger displacement, and tested also by weight measurement.

The duty, as calculated by the requirements of the contract, exceeded the guaranteed amount of 100,000,000 foot-pounds. The water-measured, by weight measurement, exceeded 5,000,000 gallons in twelve hours, corresponding to more than 6,900,000 gallons in twenty-four hours.

The engine ran with satisfactory smoothness and regularity; the shortage in the strokes averaging less than 1.50 of 1 per cent.

The engine is substantial in construction and the high-duty attachment worked very satisfactorily.

(Signed by) WILLIAM ROTCH,

WILLIAM R. BILLINGS,

ROBERT C. CROGGESHALLE,

Board of Experts representing the City of New Bedford.

A fact of the highest importance to those using pumping machinery, and especially to mines where fuel is dear, is that this high-duty attachment can be placed upon any Worthington engine heretofore constructed. During the alteration, the machine would not be thrown out of commission more than a day, and, as a rule, no alteration of the building, original pipings or foundations would be required.

The change would result in an increase in the duty of the engine of at least sixty per cent, representing a saving in fuel of about thirty-seven per cent. The cost of adding this improvement is comparatively slight, and is always warranted by the consequent decreased expenditure for fuel.

The well-known firm of pumping-engine builders, Messrs. James Simpson & Co., of London, after the fullest tests of the Worthington engine, are now manufacturing these pumps for the English and colonial markets, under an agreement with Henry R. Worthington; and in a circular they say, with regard to these Worthington engines: "We are prepared to guarantee as high a rate of duty, consequent economy in consumption of fuel with these engines, as has been hitherto obtained with the most refined type of crank and fly-wheel or Cornish engine, while the simplicity of construction, and consequent immunity from repairs, commend them to all users of pumping machinery."—*Mining and Engineering Journal*.

FAST TUNNEL DRIVING.

What the Rand Drills Are Accomplishing in Tunnel Work.

It will probably be remembered that the Rand drills as used by Contractors O'Brien and Clark in their driving of the New York aqueduct, won the \$300 prize for fast work offered last year by the contractors to the competition of their various gangs of men. At that time shaft 20, section B, won the premium, 24 men driving 254 feet of tunnel, 16 x 16 feet, in the month of July, using the Rand "slugger" drills and Rand air compressor. This was then considered the fastest tunnelling on record.

It has, however, been surpassed considerably this year at shaft 18 of the same aqueduct. In May, Messrs. O'Brien and Clark offered a prize of \$300 to the gangs of men who should, between the 25th of May and 25th of June, complete the greatest number of lineal feet of tunnel in the most satisfactory manner; and \$200 next best. There was a general struggle for the first prize, but the real fight for first place settled down toward the close of shafts 18 and 23,

the latter using 3½ inch Eclipse drills. The section of tunnel at 18 is 20 feet 10 inches wide at bottom and 18 feet high; there are 14 cubic yards of rock to the running foot as against only 6½ to 7 at shaft 23. According to the contractors' notice allowance was to be made for tunnel that required timbering; section 9 needs a great deal of timbering, and the distance driven through in the contest had to be timbered up, so that the engineers allowed 1 foot of tunnel at 18 to be equal to 1½ at 23. Here are the figures: 18½ shaft. Distance driven in the month named: Heading 265 feet, bench 175 feet; section of tunnel 20 feet 10 inches x 18 feet. This is equivalent at shaft 23 to heading 205 + 102.5 = 107.5 feet. Bench 175 + 87.5 = 262.5 feet; or in round numbers an amount of work equivalent to 290 feet of full tunnel at 23. Shaft 18½ then received \$300, 1st prize. The timbering consisted of 5-piece sets placed 5 feet apart from centre to centre and lagged on the arch. 132,000 feet of lumber were used in timbering during the contest. This is not all, the tunnel was beautifully cleaned as they went along and ditched all the way through.

This remarkable piece of work at 18½ shaft, ranks as the foremost in the whole history of modern tunnelling, where regard to cost is the essential condition. The work was done with three No. 13 Slugger Hand drills, and two No. 3 Little Giant Hand drills.

At Shaft No. 13, the Rand drills drove 277 feet of heading alone; the number of feet of heading alone driven at 23 during the contest with Ingersoll drills was 266 feet.

HONDURAS MINING COMP'YS

The Honduras Mining Company, J. P. Imboden, Supt.—Honduras, C. A., July 1, 1886.

The following report by General Manager Imboden, covering the work done at the mines up to May 31, 1886, is published for the information of the stock holders:

YUSCARAN, HONDURAS, C. A., May 31, 1886.

The Honduras Mining Company, 140 Nassau Street, New York: GENTLEMEN:—Herein please find my report of the work done during the month of June. Though all seems slow, yet much has been accomplished.

The Hydraulic work is running well, and from the start is doing good work. Though we are not advanced far enough into the old dump piles to get at the better class of refuse, yet we are getting some very fine ore after the dirt has been washed away, and the promise is No. 1—ahead of us. In the boxes of bullion sent to The Paraiso Co., I inclosed some samples that are very good. We are just getting well fixed to begin to save the ore and I think we can count on several tons of good stuff each day we work up to such time as we must strike the pillars of the old workers. I have no doubt the work will produce all we hope for it. The ground all "pans" a good and paying color of free gold. I have found it impossible to put in regular "Sluice Boxes," because I cannot spare the carpenters to do the work, but we are not losing the gold. It is lying in the drain channel and when we do put down boxes we will save it. No doubt these works will be equal to one good mill on vein matter, and I have no doubt we can count on months of steady running. Probably for 5 months we may not have full enough water to run our work, but from now till January there is no doubt about plenty of water. The same is the case with our power on our wheel at the shaft. We may have to add steam power for a few months of the dry season. Our water will run us 7 to 9 months out of the 12 months of the year, and the wise thing to do was to put in the water wheel, and we may find we can run all the year round, but I doubt if we can do so.

At the shaft I have had all work of sinking closed down to run off on the Trinidad vein, in order to start regular work on that vein. This has taken a longer time to do than was calculated upon, as we have been forced to drive in to secure our walls about the shaft so as not to weaken it. We are now driving right and left to strike a proper point to get at the vein matter, and I think this will require say until 15th July, to accomplish. We are driving night and day to secure this end, and doing all in our power. Owing to this work we have not thought it best to start up the drills, &c., but will do so in a few days. All is ready for the work.

In my last report I promised you a brick of bullion. This I did not ship you because the works were filled with other ore and the expense of cleaning up to do our work was too great to pay, and I decided to wait until such time as we could do better, and at less trouble and cost.

I will work to devote say 5 stamps of our St. Elena 40 stamps to the reduction and concentration of our ores, but now we could only save the gold and native silver, except by our crude concentration which of course we will work for all there is in it.

All things are now working well and we hope to keep them so. No question of new mines. I understand Mr. Phillips and party have arrived on the coast and are on the way up, also that the men for here will arrive soon. I will write again, during the month if I find I can get off a mail which I may be able to do. I am,

Respectfully,
J. P. IMBODEN,
Manager of The Honduras Mining Co.,

PRACTICAL AND THEORETICAL MINING.

QUESTIONS AND ANSWERS PREPARED WITH A VIEW
TO ASSIST APPLICANTS INObtaining Certificates of Competency for the Positions
of Fire Boss, Mine Boss, Mine Inspector,
Etc., Etc., Etc.

BY ROBERT MAUCHLINE, EX-INSPECTOR OF MINES

Entered according to Act of Congress in the year 1885, by J. S.
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Congress, at Washington, D. C.

VENTILATION.

Question 15.—A pipe line in a slope is 144 square inches in area and 2,000 feet long; the slope dips 1 in 10; how much total pressure on the pipe is there at the bottom of the slope?

Answer.—If the slope dips 1 in 10 the vertical height is

$$\frac{2,000}{10} = 200 \text{ feet:}$$

this is a pressure per inch of

$$\frac{200 \times 62.5}{144} = 86.8 \text{ pounds.}$$

The diameter of a pipe whose area is 144 inches is

$$\sqrt{\frac{144}{.7854}} = 13.54 \text{ inches.}$$

The total pressure tending to burst the pipe is, therefore,

$$13.54 \times 86.8 = 1175.272 \text{ pounds}$$

at the bottom end of the pipe. With cast iron having a tensile strength of 16,000 pounds per square inch, the pipe would resist this pressure if the metal was only

$$\frac{1175.272}{16,000} = .7245$$

$$\frac{.7245}{2} = .367$$

or about $\frac{1}{3}$ of an inch thick. Such pipes are made much thicker to stand handling and corroding with acid water.

Ques. 16.—With furnace ventilation, what effect will a wet upcast shaft have on the ventilation of a mine, and would difference of depth have any bearing on the amount of air in circulation?

Ans.—A wet shaft would absorb heat and lower the temperature, thus counteracting the effect of the furnace. If all other things are equal, the depth of the shaft is a measure of the pressure, and the quantity varies as the square root of the pressure and, therefore, as the square root of the depth. To double the depth would increase the volume as

$$\sqrt{1} : \sqrt{2} \text{ or as } 1 \text{ is } 1.41$$

or less than $\frac{1}{2}$ more air.

Ques. 17.—With three airways 3 feet by 4 and one large airway 6 feet by 6, which will give the most air with the same power applied and what would be the difference and why?

Ans.—The sum of the areas of the three airways is

$$3 \times 4 \times 3 = 36 \text{ square feet.}$$

The sum of their perimeters is

$$2 \times 3 + 2 \times 4 \times 3 = 42 \text{ feet.}$$

The area of the large airway is 36, and its perimeter is

$$4 \times 6 = 24 \text{ feet.}$$

The areas are equal, therefore the total is equal, and the quantities passing will be in inverse proportion to the cube root of the perimeters.

$$\sqrt[3]{42} = 3.4 \text{ and } \sqrt[3]{24} = 2.8,$$

therefore the quantity that would pass in the 6 × 6 would be to what would pass in the three small airways as

$$1:21 \text{ is to } 1 \text{ or } \frac{1}{21} \text{ more.}$$

Ques. 18.—The downcast shaft of a colliery is

$$10 \times 14 \text{ and } 1,000 \text{ feet deep,}$$

the upcast or air shaft being circular 10 feet in diameter and the same depth. The air course under ground 6 × 7 and 4,000 yards in length, with a volume of 40,000 cubic feet per minute passing. After the airways underground are split as follows:

$$\begin{array}{l} \text{1st split } 8 \times 8 \text{ and } 5,000 \text{ feet long,} \\ \text{2d " } 6 \times 6 \text{ " } 6,000 \text{ " " " } \\ \text{3d " } 5 \times 5 \text{ " } 3,000 \text{ " " " } \end{array}$$

how much air will pass in each split, the power remaining the same?

Ans.—The downcast, the airway, and the upcast, form a continuous air course of three different di-

mensions, therefore let us find a section of airway of the same area and perimeter as the given airway, that will offer the same resistance as the shafts by the following formula:

$$L = \frac{A^3}{O} \times \frac{s}{a^3}$$

Where A = area; O = perimeter, and L = the length of the airway having the same resistance as the shafts, while s and a represent the area and rubbing surface of each shaft.

	Area square feet.	Surface.	Sq. ft.
Downcast.	$10 \times 14 = 140$	$2 \times 10 + 2 \times 14 = 48$	48,000
Upcast.	$10 \times 7.854 = 78.54$	$10 \times 3.1416 \times 1,000 = 31,416$	
First split.	$8 \times 8 = 64$	$4 \times 8 \times 5,000 = 160,000$	
Second "	$6 \times 6 = 36$	$4 \times 6 \times 6,000 = 144,000$	
Third "	$5 \times 5 = 25$	$4 \times 5 \times 3,000 = 60,000$	

The area and perimeters of the airway as given, is 6 × 7 = 42 square feet, and 2 × 6 + 2 × 7 = 26 feet respectively.

$$\text{Then } \frac{42^3}{26} \times \frac{48,000}{140^3} = 49.83 \text{ feet,}$$

as the length of airway having equal resistance to the downcast, and

$$\frac{42^3}{26} \times \frac{31,416}{78.54^3} = 184.65 \text{ feet}$$

as the length equal in resistance to the upcast. 184.65 + 49.83 = 234.48 feet as the length of the airway equal in resistance to the shafts, and by adding this to the airway, we have a continuous air course equal to the whole resistance of the mine.

The three splits take the place of the airway; therefore we will try to find the required length of airway which will equal them in resistance by the following formula. First,

$$\frac{1}{\sqrt{\left(\frac{1}{a}\right)^2 \times s}}$$

applying this to each separate split gives us the following relative quantities:

First split,

$$\frac{1}{\sqrt{\left(\frac{1}{64}\right)^2 \times 160,000}} = .4048.$$

Second split

$$\frac{1}{\sqrt{\left(\frac{1}{36}\right)^2 \times 144,000}} = .5883.$$

Third split

$$\frac{1}{\sqrt{\left(\frac{1}{25}\right)^2 \times 60,000}} = .5128.$$

Total

$$1.5059$$

Then the length of airway having equal resistance to the splits is found by the following formula:

$$\frac{\left(\frac{1}{r}\right)^2 \times A}{\left(\frac{1}{A}\right)^2} = S,$$

r being the sum of the relative quantities found for each split with A representing the area of the airway to which we are reducing them, and S the rubbing surface found. Applying this formula we obtain

$$\frac{\left\{\frac{1}{1.5059}\right\}^2 \times 42}{\left(\frac{1}{42}\right)^2} = 25,401 \text{ square}$$

feet as the rubbing surface. This divided by the perimeter gives the length. The perimeter of the airway is 26 feet.

$$\frac{25401}{26} = 976.9 \text{ feet}$$

as the length of airway having equal resistance to the splits. If we now add this to the equivalent of the shafts, the sum will be the length of airway equal to the mine after the air is split.

$$236.48 + 976.9 = 1213.38 \text{ feet.}$$

The airway is 4,000 yards = 12,000 feet, this added to the equivalent of the shafts, will give the length of airway equal to the mine before the air is split.

$$12,000 + 234.48 = 12234.48 \text{ feet.}$$

Airways under equal powers will pass quantities inversely as the cube root of their surface and directly as their area, or as the reciprocal of the cube root of their surface into their area, or

$$\frac{1}{\sqrt[3]{s}} \times a$$

but as our two airways are equal in area and perimeter, we can cancel a and consider the length as S and the formula becomes

$$\sqrt[3]{\frac{1}{s}}$$

Applying this formula we get

$$\text{Before splitting } \frac{1}{\sqrt[3]{12234}} = .0434;$$

$$\text{After splitting } \frac{1}{\sqrt[3]{1211}} = .0933.$$

Then by proportion we find the quantity

$$.0434 : .0933 :: 40,000 : 89,912$$

cubic feet per minute as the quantity passing after splitting. The splits being subject to equal pressure will pass quantities in proportion to

$$\sqrt{\frac{Pa}{Ks}} \times a,$$

but as P and K are equal in all the splits, the formula becomes

$$\sqrt{\frac{a}{s}} \times a$$

and we will use this to distribute the air found among the splits according to their resistance under equal pressure.

First split,

$$\sqrt{\frac{64}{160,000}} \times 64 = 1.28$$

Second split,

$$\sqrt{\frac{36}{144,000}} \times 36 = .5924,$$

Third split,

$$\sqrt{\frac{25}{60,000}} \times 25 = .50;$$

Total sum,

$$2.3724;$$

then by proportion we find the quantity in each split,

$$\begin{array}{l} 2.3724 : 1.28 :: 86912 : 46892.33 \text{ in first split.} \\ 2.3724 : 0.5924 :: 86912 : 21702.35 \text{ " second " } \\ 2.3724 : 0.50 :: 86912 : 18317.32 \text{ " third " } \end{array}$$

$$\text{Total } 86912.00$$

The sum of the splits coincides with the volume, therefore the distribution is correct.

Ques. 19.—Supposing there are two airways, one 4 × 12 feet the other 8 × 8 feet, how much more air will pass in the one than in the other with the same pressure?

Ans.—As no quantity is given for the smaller airway and no pressure or length to find a quantity, all we can do is to show the relation between the quantities that will pass under equal pressures.

The rubbing surfaces being equal, they will pass quantities under equal pressure according to

$$\sqrt{a \times a}$$

$$\text{First airway } \sqrt{48 \times 48} = 332.16.$$

$$\text{Second airway } \sqrt{64 \times 64} = 512.$$

$$\frac{512}{332.16} = 1.54$$

The quantity that will pass in the large one being $\frac{1}{2}$ more than in the small one.

Ques. 20.—If there are two airways one 4 × 4 and the other 8 × 8 how much more air would be got in the larger one, allowing 5,000 feet per minute for the small one, pressure and length being the same?

The quantities will be according to

$$\sqrt{\frac{a}{s}} \times a$$

First airway,

$$\sqrt{\frac{16}{16}} \times 16 = 16;$$

Second airway,

$$\sqrt{\frac{64}{32}} \times 64 = 90.496.$$

16 : 90.496 :: 5,000 : 28,280 feet per minute in the large airway.

(To Be Continued.)

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PUBLISHED EVERY SATURDAY

-AT-

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FOR THE WEEK ENDING

SATURDAY, AUGUST 14, 1886.

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BUSINESS PROSPECTS.

At no time during the past four years has the business outlook been as promising as at present. The improvement which began a year ago has developed slowly but surely, and the prospect of comparative and increasing business activity in the future is so promising that an air of confidence pervades every business centre in the country. The recent changes of circumstances, with a single exception, have been favorable to an increase of business prosperity, and in the present condition there can be little doubt that the country and the people will avail themselves of every opportunity that may be offered to expand their business.

Congress has adjourned and the agitation of the tariff and currency question is postponed for a period of at least a year and a half, as it is almost certain that neither of these questions will be taken up at the coming short session. The failure of the President to sign the Morrison resolution and the refusal of the Administration to comply with the spirit of its provisions may retard the improvement in business somewhat, as it is a fact that there is an actual and growing scarcity of money at the commercial centres of the country. This is nowhere more distinctly reflected than in the bank statements, which show a surplus of only about \$8,000,000, as compared with \$60,000,000 a year ago. The rapid increase in business during the past year has created a growing demand for money which has consumed the bank surplus and which can only be supplied now by the disbursements of liberal monthly sums of the stores now in the Treasury, in payment of the interest-bearing debt. It is probably useless to count on the Administration to relieve a stringency of this kind in the way indicated, unless a reaction should set in quickly and that prices should take a downward tendency. This, though possible, is not probable at present, and if the necessity for unlocking the money hoarded in the Treasury should become sufficiently great during the next six months, it is not unlikely that Congress may find a way to put it in circulation without the President's consent. In the meantime it is a fact that the scarcity of money alone can check the rising tide of industrial and commercial prosperity, that began a year ago, after values had been pressed to the lowest point reached in a quarter of a century.

The total number of business failures reported in the United States last week was 162, against 194 the previous week, 184 for the corresponding week of last year, 199 in 1884, 155 in 1883 and 122 in 1882. The total in the United States this year to date is 6,133, against 7,015 in a like portion of 1885, 6,186 in 1884, 5,388 in 1883 and 4,125 in 1882.

Of the present condition of the iron trade it may be said that it is flourishing as it has not flourished in six years before. The semi-annual report of the American Iron and Steel Association for 1886, which is just issued, indicates that the production of pig iron and of Bessemer and open-hearth steel in the United States has exceeded the total of any preceding half year. There has been no great advance in the price of iron, but the consumption, it will be seen, is enormous. Steel rails remain active at \$34.50 and \$35.00 per ton and the mills are all well supplied with orders.

The Anthracite coal trade, although not quite as active as could be desired, is far from discouraging. There has been an advance in actual prices of stove coal to \$3.50 and of chestnut to \$3.15 at New York, and a further advance of fifteen cents per ton is talked of for next week. The decision to mine but 2,500,000 tons of coal during the present month, instead of 3,500,000 tons, as proposed by some companies, is acknowledged to have been a wise move, the result of which it is now believed will be a reduction of the stocks at tide water to a point by September 1st, that will warrant the operating of the collieries to their full capacity during the remainder of the season.

THOS. B. BANCROFT, chief inspector of mines in Ohio, has our thanks for a copy of the amended laws on mine management in that state.

An engine in course of construction at Philadelphia is expected to take a train from that city to New York in ninety minutes.

The statement that cigarette-smoking induces softening of the brain is purely theoretical, and can not be verified until people with brains to soften attempt the experiment.

COAL promises to go up in price, as well as in smoke, ere long.

EVERY town should strive to add to its list of home industries, let them be of whatever size or character they may. Every addition to the ranks of industrials is a notch cut in the staff of progress.

LABOR strikes in the west sent its chief cities far down in the scale of development as shown forth in the statistics. The figures for the first six months of this year show a falling off in this species of growth of fully sixty per cent. In this loss labor has been by far the heaviest sufferer.

A FRIEND at United, Pa., writes us that two hundred and ten new ovens have been erected in that vicinity this Summer, and that thirteen day and one night mule are required to haul the coal to the shaft bottom. This indicates an extensive development of the mine.

THE National Federation of mine workers is being rapidly organized in the Lonaconing, Md., and Frostburg regions. Meetings are being addressed nightly by the delegated organizers. This association aims to do away with strikes as a method of redressing labor grievances, and to unite employers and men on a common ground of reason and arbitration.

THE Hocking Valley miners say that improved labor saving machinery shall not be introduced in the mines of that region unless the displaced labor is compensated for. Just how they expect to receive this compensation is not stated. The employers are quoted as saying the machinery will go in, if armed force be necessary to achieve its introduction. There is likely to be more and serious trouble in the Hocking Valley, unless cooler counsels prevail on both sides of the dispute.

AMID these days of strikes it is well to remember that the greatest working army of the world never ceases its regular labor, knows no lockouts and seldom experiences a raise of wages. They know more of practical labor economy, their toil comes closely home to every circle of life and is of incalculable benefit to the world, yet they are the least appreciated in private and public of all our artisans, and are the most uncomplaining of any who toil and spin. We refer to the wives and mothers of the country's households.

THERE is something for free traders to consider who deprecate tariff protection on the score of its injury to labor, in the following figures: Prior to the restoration of import duties on iron, in 1879, there were employed in 274 German establishments 129,277 laborers to whom were paid \$8,039,260 thalers. In 1886 the same shops and mills employed 175,554 workmen and paid them 11,450,118 thalers. Thus under protective duties there was an increase of laborers of 38.8 per cent., and of wages paid 42.8 per cent. Facts knock the pins from under theories.

PERHAPS after all the Keely motor is not the stupendous fraud that it has been represented. An eminent scientific writer, who has taken up the cudgels in its defence, makes a very strong point when he asks: "May not the correlation and interaction of the forces of sound, electricity, and cohesion, through certain appliances and manipulations, evolve interatmospheric vapor of hitherto unknown expansibility?" Every intelligent man must admit that it may, and there seems, therefore, to be no good reason why Keely motor stock should not enjoy an immediate boom.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, July 31, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	52,442-06	1,202,922-12
Shipped South.....	32,119-01	1,638,778-18
Total.....	84,561-07	2,841,721-10
For corresponding time last year.....	52,100-00	1,134,789-08
Shipped North.....	45,821-01	1,336,642-12
Shipped South.....	98,021-01	2,471,432-02
Total.....	93,559-14	370,789-08
Increase.....		
Decrease.....		

The greatest length of Lake Huron is 250 miles; greatest breadth, 190 miles; mean depth, 800 feet, elevation, 578 feet; area, 21,000 square miles.

DUST IN MINES.

How It May Be Laid to Prevent Gas Explosions—A Matter of Importance.

In a paper contributed to *Nature* Mr. Galloway says:—

In a paper recently contributed to the South Wales Institute of Engineers,* Mr. Archibald Hood, the president, says:—

"It was probably first suggested by Faraday and Lyell about the year 1845 that coal dust was in some way inflammable. This idea was subsequently set forth by several French engineers, but all that was done previous to the year 1875 bears the same relation to subsequent demonstrations as the steam engine of the nineteenth century."

Assuming Mr. Hood's date to mark correctly the commencement of the real battle between the new theory and its predecessors, it cannot surely be urged that the period of ten years which has since elapsed has been too long wherein to destroy the vast herd of previously existing chimeras, and to introduce and establish a new and different order of ideas. Doubtless the result attained up to the present has been prodigiously accelerated by the labors of the Royal Commission on Accidents in Mines, and of the similarly constituted bodies in France and Germany, all of which have been called into existence and have completed their labors within the period named. Indeed, scarcely had the ink with which the English report was written been dry when the Home Office introduced a new Mines Regulation Bill which provides, among other things, that "in all dry and dusty mines the air-ways and travelling roads are to be kept clear of dust or well watered, and a shot is not to be fired until the place and that near it is cleared of dust and then well watered." (*Mining Journal*).

The crudeness of the idea embodied in the first alternative, which appears to contemplate the possibility of removing the dust from roadways and airways without the simultaneous use of water, reminds one of an incident of the interview between Christian and the interpreter (*Pilgrim's Progress*):—

"Then he took him by the hand and led him into a very large parlor that was full of dust because never swept; the which, after he had reviewed it a little while, the interpreter called for a man to sweep. Now when he began to sweep the dust he came so abundantly to fly about that Christian had almost therewith been choked. Then said the interpreter to a damsel that stood by, 'Bring hither water and sprinkle the room,' the which, when she had done, it was swept and cleansed with pleasure."

It has all the appearance of being a compromise between efficiency on the one hand and ignorance or prejudice on the other, and closely resembles, in this respect, the first General Rule of the Act for the Regulation and Inspection of Mines, 1860, (23 and 24 Vic., cap. 151), according to which a mine was required to be ventilated only in such a way as to be safe under ordinary circumstances. But just as these safe under ordinary circumstances, and that all qualifying words were found to be a cloak for all kinds of inefficiency in the matter of ventilation, and had to be ultimately expunged after a twelve years' trial, so we venture to predict will this other unscientific alternative, if passed into law, cause endless trouble and disaster, and require to be similarly dealt with at some future time.

To lay the dust sufficiently well to prevent the spread of an explosion requires a much smaller quantity of water than appears to be generally supposed.

This has been stated more or less directly several times in describing the results of coal dust experiments; but it was very clearly brought out in the examination of the workings of Pochin Colliery, in Monmouthshire, after the great explosion in November, 1884. The flame which in that case had all filled the mine, and had penetrated in the remotest parts of three districts of workings ventilated by separate air-currents, was found to have been arrested by a slight dampness on one of the roadways leading to several working-places. A cask conveying water from a dip place to a point more convenient to the pumps was hauled along this roadway four times every twenty-four hours, and it was stated by the manager of the colliery at the time that the dampness in question was due simply to accidental leakages from this cask and not to any intentional application of water for the purpose of laying the dust. At the inquest on Mardy explosion also, in January last, it was pointed out that a similar accidental or irregular system of watering appeared to have stopped the flame in four different directions, and to have saved the lives of many of the workmen (*Western Mail*, January 21, 1886).

Systematic watering with the avowed object of preventing the spread of explosions has hitherto been practised in very few collieries in this country. Llynypia Colliery in the Rhondda Valley is a notable exception. Soon after the earliest coal dust experiments had been made there in 1875 the intelligent proprietors and manager constructed a number

of water-tanks on wheels, each provided with a perforated pipe at the back like an ordinary water-cart. Some of these were intended to be drawn by horses along the less frequented roadways, others to be attached to the trains of wagons which are drawn along the under-ground railways by means of wire ropes actuated by engine power. The result of watering by this means was satisfactory and remarkable. The whole mine became cooler and more pleasant to live in. The dust as such disappeared not only from the floor of the roadways, but also from the timbers and from the ledges formed by the irregular projections in the side walls, and became consolidated into a firm, compact and slightly humid mass under foot.

OHIO ENGINEERS.

The Summer Meeting and the Important Papers They Discussed.

The Ohio Institute of Mining Engineers met in the city of Steubenville, Ohio, on the 14th inst. The attendance was quite large, though a number who were expected failed to put in an appearance. President Hazeltine was delayed owing to sickness in the family.

The citizens of Steubenville spared no pains to make the meeting a success. The institute met in the new opera house and was welcomed in an excellent address by Mr. Sherrand, president of the Steubenville Coal and Mining Co., which contained a fund of valuable information in regard to the resources of Steubenville. The address of welcome was responded to by Andrew Roy.

The following papers were read:

The Labor Question, by Andrew Roy; The Maxburg Oil Field, N. J. Herter; Coke Manufacture in Ohio, T. B. Bancroft; History of Iron Making, Henry Price; Sampling of Blast Furnace Stock, Ed. Orton, Jr.; Amelioration of Mining, J. G. Chamberlain; Long Wall Mining, Wm. Dalrymple; Underground Haulage, J. L. Morris.

These papers were each discussed at length.

The superintendent of the Cleveland and Pittsburgh road placed a train at the disposal of the Institute and nearly two days were occupied in sight seeing. The citizens of East Liverpool tendered the institute a complimentary dinner.

The institute adjourned on the 18th, and all returned to their homes feeling that they had had a pleasant and instructive meeting.

Directions for Setting up Pumps.

Never use pipes of smaller size than that given in the tables. When long pipes are used, it is necessary to increase the diameter to allow for the increased friction, especially in regard to the auction pipes.

Use as few turns and angles on pipes as possible, and run every pipe in as direct a line as practicable. Bends, returns and angles increase friction more rapidly than length of pipe.

See to it that the pump has a full supply of water.

In pumping very hot water, always flood your pumps by placing it so that it will be supplied from a head.

A gallon of water (U. S. Standard) weighs 8 1/3 lb., and contains 231 cubic inches.

A cubic foot of water weighs 62 1/2 lb., and contains 1,728 cubic inches, or 7 1/2 gallons.

Doubling the diameter of a pipe increases its capacity four times.

Friction of liquids in pipes increases as the square of the velocity.

Each nominal horse-power of boilers requires 30 to 35 lbs. of water per hour.

To find the area of a piston, square the diameter and multiply by .7854.

To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434.

To find the capacity of a cylinder in gallons: Multiply the area in inches by the length of stroke in inches, will give the total number of cubic inches; divide this amount by 231 (which is the cubical contents of a gallon in inches), and the product is the capacity in gallons.

Ordinary speed to run pumps is 100 feet of piston per minute.

To find quantity of water elevated in one minute running at 100 feet of piston per minute: Square the diameter of water cylinder in inches, and multiply by four. Example: Capacity of a five-inch cylinder is desired. The square of the diameter (5 inches) is 25, which, multiplied by four, gives 100, which is gallons per minute (approximately.)

To find the horse-power necessary to elevate water to a given height, multiply the total weight of column of water in pounds by the velocity per minute in feet, and divide the product by 33,000. (An allowance of 25 per cent should be added for friction, etc.)—*Steam Fitter*.

According to the *Canada Medical Record* Pavesi recommends a liniment composed of camphorated chloral 2 parts, pure glycerine 16 parts, and oil of sweet almonds 10 parts. This is to be well mixed, and preserved in a hermetically closed bottle. A pledget of very soft cotton is to be soaked in the liniment, and then introduced as far as possible into the affected ear, two applications being made daily. Frictions may also be made each day with the preparation behind the ear. It is claimed that the pain is almost immediately relieved, and even in many cases the inflammation is subdued.

SCIENTIFIC SUBJECTS.

HOW RAIN IS PRODUCED.

Did it ever occur to the reader that there is just as much water in the air above him on a clear, bright day as on a cloudy or rainy one? Rain does not come from somewhere else, nor is it wafted over you by the wind from elsewhere. The water that was over you is simply wafted on to some other place. Water is absorbed in the air above us at a certain temperature, and it becomes insensible. Cool that air by a wind draft of cooler atmosphere, or by electrical or chemical influences, and the moment the air becomes cooler it gives up some of the watery particles that were insensible or invisible at the higher temperature. These small particles thus given out unite, and when enough of them coalesce, obstruct the light and show as clouds. When enough of them unite to be too heavy to float in the air, they begin to descend; pair after pair of them come together until a rain-drop is formed. One of these minute rain-drops is made up of millions of infinitely small watery particles.

Air passing over the cold tops of mountains is cooled down so that it gives up a good deal of the concealed watery vapor, and hence little rain falls in the region along the lee side of such mountains. This is why so little rain falls in Colorado, and in other places north and south of that state. The prevailing winds blow from the west, and the cool tops of the Rocky mountains lower their temperature and thus take out the moisture that would otherwise fall in rain.

THE FUTURE SUPPLY OF IRON ORE.

Dr. Percy, president of the British Iron and Steel Institute, recently delivered a very interesting address before that body, in the course of which he said: "The future of our supplies of iron ore is a subject of no small interest to members of the institute. The Bilbao and other fine ores are being rapidly exhausted, and it is predicted that such exhaustion is not far distant. It is difficult to tell, but I have been informed by an American gentleman thoroughly acquainted with the iron and steel trades, who has been scouring the world in search of suitable ores, that, in his opinion, such ores before very long are likely to become scarce, and consequently to fetch a higher price than at present. This is a somewhat startling announcement. But there are doubtless many unexplored localities in which it is probable good ore will be discovered. The cost of transit, however, and the other local circumstances, may, in some cases, render the ore unworkable on the ground of economy. I may mention a fact which my friend Mr. Bauernhan has communicated to me—namely, that in recently visiting South America, he saw one locality enormous deposits of fine hematite, which extended over a long range. These deposits are as yet untouched, and access to the coast would be very expensive in the absence of roads, as is the case at present."

THE WASTE OF LIFE.

An English naturalist remarks that it is a sad reflection that while the turbot lays 14,000,000 eggs, more than one, on the average, ever lives to reach maturity. In fish generally it takes yearly at least a hundred thousand eggs for each individual to keep up the average of the species. In frogs and amphibians a few hundred are amply sufficient. Reptiles often lay only a much smaller number. In birds which hatch their own eggs and feed their young, from two to six eggs per annum are quite sufficient to replenish the earth. Among mammals, three or four at a birth is a rare number, and many of the larger sorts produce one calf or foal at a time only. In the human race at large, a total of five or six children for each married couple during the whole lifetime makes up sufficiently for infant mortality and all other sources of loss, though among savages a far higher rate is usually necessary. In England an average of four and a half children per family suffices to keep the population stationary.

INFLUENCE OF TEMPERATURE ON THE STRENGTH OF IRON AND STEEL.

B. Papkoff gives in the *Russian Mining Journal* an account of an extensive series of experiments on the influence of cold on the strength of iron and steel in various forms and under various kinds of strains, but circumstances obliged him to abandon his intentions after a few tests had been made. He thinks, however, that the results he was able to obtain are worth being made known, because they seem to point to conclusions totally opposed to those generally received. All the specimens tested were taken from soft steel and iron plates, three samples being cut from each plate. One sample of each group was tested at the ordinary and two at the low temperature. It was found that both the ultimate strength and per centative elongation increased very sensibly with the decrease of temperature; the author remarks that such a result was to be expected, because the contraction caused by cooling has the effect of bringing the particles of matter closer together, and consequently of intensifying the force of cohesion; but he also observes that a law which may be found general for strains gradually imposed may not apply at all when they assume the nature of shock or of impact.

Engineer Howard, of the Coosa Coal and Coke Company, is an inventor and a philanthropist. He has invented a system of mine ventilation which bids fair to eclipse all others, and what is striking about it is that Mr. Howard has not patented it, but permits it to be used in all mines free of charge. The advantages of this system over others are its cheapness and its simplicity, and it economizes by using only waste steam. Mr. Howard has also invented a system of creating intense heat with a small amount of fuel, which will be of great utility.

*"On the Watering of Dusty Mines." The South Wales Institute of Engineers, March 18, 1886.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

Wants the Pressure.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following question for answer by some of your corps of writers:

A gas pipe 10½ inches in circumference being laid from a gas well for a distance of 18 miles, what will be the atmospheric pressure on the pipe throughout its length?

Yours, &c.,

J. N.

Brilliant, Ohio, August 4, 1886.

What Caused the Light?

Editor Mining Herald and Colliery Engineer:

SIR:—A few days ago the steam jet at the bottom of our airshaft became choked up with rust and scale. To remove the obstructions I inserted in the holes a piece of sharpened umbrella wire. When I held the wire firmly over the holes with the full force of steam escaping, I saw a small bright spark attached to the wire amid the flowing steam. Holding the wire near the end over the jet, a continuous streak of light appeared, running from the escaping steam to the opposite end of the wire. The boiler pressure was about 100 pounds to the square inch; distance from jet to boiler 370 feet; the pipe is supported on wooden trestles. Will some of your writers oblige by explaining this incident?

Yours Truly,

J. W.

Portage, Pa., Aug. 4, 1886.

Mining Questions.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you kindly insert the following questions for answer by some of your able correspondents. In order to secure a prompt reply I would refer them to "Door Tender" or "Boss," of Shenandoah, but would be pleased to hear from any.

1.—If 6,000 cubic feet of air pass through an airway 10 feet square, how much will pass through one 5 feet square, the pressure remaining the same?

In order to save the parties referred to any extra trouble, I will give the result of working the question by various formulas, and ask merely which, if any of them, is the proper method of solution?

Using $\sqrt{s} \propto a$ I obtain 1061 cubic feet.

$$\sqrt{\frac{P}{Ks}} \propto a \quad " \quad 2125 \quad " \quad "$$

$$\frac{u}{p} \quad " \quad 1500 \quad " \quad "$$

$$\sqrt[3]{\frac{u}{Ks}} \propto a \quad " \quad 1500 \quad " \quad "$$

To find results as above is, to say the least, very unsatisfactory.

2.—What principle governs parties when building air stacks over an upcast, as is common in this region, of the following or similar dimensions: 10 x 10 feet at the base, and 4 x 4 feet at the top? Does such a stack give the best results?

Yours, &c.,

D. H. THOMAS.

Houtzdale, Pa., July 19, 1886.

Miscellaneous Questions and Answers.

Editor Mining Herald and Colliery Engineer:

Question 1.—What is a "tipper" as used at the mines?

Answer.—The tipper is a machine for emptying the wagons or mine cars. There are many different kinds of tipplers in use. Where the mine car has a door at the end, any arrangement which receives

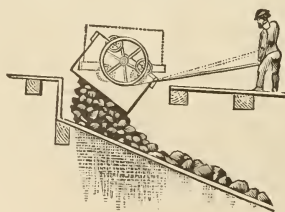


Fig. 1.

the car and tilts it over at an angle of about 30° will

empty the car; but cars without doors have to be turned bottom up by a tipper, similar to that shown by fig. 1.

Ques. 2.—Show the different signs or marks generally used on maps of collieries.

Ans.—The different features of a colliery map are represented in the following manner.

Air crossings are marked by



Coal worked is " "



Dip of strata " "



Direction of air current " "



Door



Canvass to guide air " "



Down-cast shaft



Faults in seam " "



Ventilating furnace " "



Regulators on air current " "



Inside shaft to different seams by



Air stopping



Up-cast shaft



Ques. 3.—What is meant by double timber?

Ans.—Where the top and sides of gangways, schutes, airways, or other permanent openings of a mine are such that single props will not secure them, then the timber consists of a cross piece or "collar" placed on two props or legs as shown in fig. 3. These frames, or sets, are placed 4 to 5 feet apart and round poles or lags are placed behind them to secure the sides and top.



Fig. 3.

This is called double timber.

Ques. 4.—What system of mining is known as "wide work?"

Ans.—A system of working formerly adopted in Yorkshire, England, but now nearly obsolete. A set of chambers, generally four, were worked as one face each seven or eight yards wide, a few feet of wall as a pillar being left between each, the large pillar between each set or panel being afterwards mined out back towards the main level. Fig 4

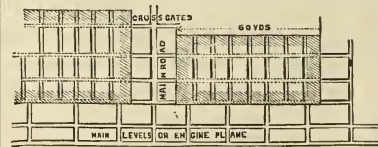


Fig. 4.

shows the general plan of working known as wide work. The idea was to work a broad piece of sixty odd yards, with only three walls of coal as pillars to conduct the ventilation and keep the road open to each face; thus saving the expense of cross headings for air. But the pillars often crushed out and closed the whole set; hence the system is now obsolete in deep mines.

Ques. 5.—What is a down-throw?

Ans.—A dislocation of the strata, which cuts off the coal seam and lowers it below the original level. In fig. 5 assume the mine to be driven in the direc-

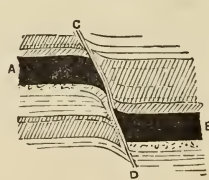


Fig. 5.

tion from A to B, the line C D along the slip will be a down-throw, and in the other direction it would be an up-throw.

Shenandoah, Pa., Aug. 3, 1886.

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F. M. Co. Box 115, Newport, Ky.

Chicago.

From the Industrial World.

The coal market has shown considerable improvement during the week. Not only has the inquiry from the country trade and manufacturers been greater, but the volume of sales has increased visibly, and the producers of Anthracite have ordered an advance in price of 15 cents per ton. While with some dealers this advance has tended to check sales to some extent, others report that they have done more business in the first three days of this month than in any one week during July. A number of large contracts for both hard and soft coals have been placed, amounting to several thousand tons. Lake freights are without change at 60 cents from Buffalo.

The movement in Anthracite is increasing steadily, as the orders from the country and the city dealers begin to come in more liberally. A number of round orders have already been placed, while others are still in the market. The advance in price of 15 cents per ton, it is thought, will generally be observed by the wholesale dealers, although as yet it has not affected the retail trade. Concessions of 25 cents per ton below the card rates can be obtained by dealers on large lots.

Soft coals are picking up slightly in demand, and the movement into the country is becoming more general. We also hear of some round orders for manufacturing purposes in the city, but nothing extraordinary. Prices are about steady at old figures.

In Cannel coal there is not much doing, and no sales to test values have come to light.

The demand for coke continues good, the supply on hand being about equal to the call.

Charcoal presents no new features.

We quote as follows:

ANTHRACITE.	
Per gross ton by carload, 2240 lbs.	
Grate.....	\$ 5 60
Stove.....	5 80
Nut.....	5 88
Lehigh Lump.....	5 88
Per net ton by carload.	
Grate.....	\$ 5 13
Stove.....	5 13
Nut.....	5 18
Lehigh Lump.....	5 18

BITUMINOUS.	
Erie & Briarhill.....	\$4 15
Pittsburg.....	3 20
Indiana Block.....	2 40@2 50
" Slack.....	1 25@1 35
" Nut.....	1 85@1 90
Baltimore & Ohio.....	2 75@2 90
Hocking Valley.....	2 75@2 90
Youghiogheny.....	3 20@3 30
Wilmington.....	2 10
Blossburg.....	3 25
Cumberland.....	3 25
Souman Smithing.....	3 40
Grape Creek.....	2 00
Pontiac County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Minonk.....	2 00
Morrill.....	2 00

CANNEL.	
Kanawha.....	4 50
Buckeye.....	4 25

COKE.	
Connellsville Coke.....	5 00
Crushed Coke.....	5 50
Charcoal, carload per bu.....	8½@9½

Pittsburg.

From the American Manufacturer

The river continues low—too low to send out loaded vessels or to bring back empty ones. Nearly all the mines along the Monongahela continue idle. This is owing to three causes; first, the usual annual repairs and improvements; 2d, the absence of shipping water, 3d, large stocks in the lower markets. The receipts of coal by slack water at Pittsburg for the six months from January 1 to June 30 were 76,274 bushels, compared with 81,700 bushels for the whole of last year, which is a difference of only 5,426 bushels. The general position at the railway mines has undergone little or no change. We continue to quote as follows:

PRICES AT PITTSBURG.	
River, wholesale, on board.....	3½@4½ cts. per bushel.
Railroad.....	4½@5½ cts. per bushel.
AT CINCINNATI.	
River, wholesale, on board.....	5½@6½ cts. per bushel.
AT LOUISVILLE.	
River, wholesale, board.....	5½@6½ cts. per bushel.
AT NEW ORLEANS.	
River, wholesale, on board.....	25@26½ cts. per bu.

Bushels are rated among dealers here at 76 lb.—26½ bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke—There are no changes to note. All the ovens continue in operation, and consumptive requirements take all the product. Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

ALUMINIUM.

An Unlimited Supply at a Low Price Still a Dream.

If the modern metallurgist ever indulges in day-dreams like those of his predecessor, the alchemist, and pictures himself possessed of a spell powerful enough to subdue the most stubborn chemical affinities, surely it must be on aluminium that his mental gaze fixes itself at such times. An ample supply of that metal would utterly transform all engineering, and might easily remodel the conditions of our life. The mind might dwell for days upon the changes which would be effected by the introduction of a tenacious structural material of one-third the specific gravity of iron, without being able to grasp them fully. What a revolution it would effect in naval architecture, how the spans of our bridges would increase, and what a growth there would be in the power of the engineer to attack difficulties which now seem impossibilities! But the qualities of strength and lightness are not all that aluminium has to recommend it. It has a low melting point, about 1000 deg., and not only can be cast with facility, but it works well under the hammer. It will not oxidize even at a red heat, and will resist all acids, except hydrochloric. It will alloy with most metals, and in so doing lends them a large share of characteristics. It is a capital conductor of electricity, and, indeed, seems to combine in itself all the good qualities of all other metals.

At present an unlimited supply of aluminium at a low price is still a dream, but as events march we might any morning awake to find it a reality. For some time it has been produced in England by Webster's Aluminium Crown Medal Company, of Birmingham, at the price of 60s. per pound for the contained aluminium. Even the latter price is, of course, prohibitive for employment of the pure metal for most uses, but it is admitted by the manufacturers that an early date, a heavy reduction will be made, and then we shall see its rapid introduction. But although aluminium is for the present commercially unattainable, its alloys are already in the market, and bid fair to displace all the bronzes and brasses. One form has already been described in these columns under the name of Mitis Castings. These, it will be remembered, are castings made from wrought iron melted in a petroleum furnace. The secret of the success of the process lies in the addition of from 0.05 to 0.1 per cent of aluminium to the molten metal. This has the effect of suddenly lowering the melting point of the mixture by 300 deg. to 500 deg., and thus without superheating the metal in the furnace, it is rendered exceedingly malleable, and becomes sufficiently furnished with a store of surplus heat which enables it to run into molds and fill them perfectly. Recently a leading steel maker in America, wishing to test the system, made two castings on this plan, welded them together, and then drew them into wire, which exhibited a breaking strain of 90,000 lbs. per square inch. This result showed that not only was the original quality of the iron preserved, but that it had actually been improved by melting and the addition of the aluminium.

Another important alloy was made with copper, nine parts of the latter to one of aluminium. This will work better under the hammer, and can be spun, rolled, and drawn with great facility. Under the latter condition its tensile strength will run up to 200,000 lbs. to the square inch, while in rolling the greater toughness of the metal more than compensates for its higher price. Castings made from this mixture have a fine golden color which is permanent, and have a tensile strength of 100,000 lbs. to the square inch. When the proportion of aluminium is lowered to 5 per cent, the tensile strain is reduced to 68,000 lbs. per square inch, and even with but 2 to 3 per cent of aluminium, the alloy is stronger than brass. Another alloy, called Hercules metal, is composed of copper, nickel, and zinc, with a small percentage of aluminium, and this has withstood a strain of 105,000 lbs., break ng without elongation.

The great decrease in the price of aluminium is due to the introduction of the electric furnace. This was invented by Sir William Siemens, but his death prevented him from bringing it to perfection. In America the matter was taken up by Messrs. Eugene H. and Alfred H. Cowles, and by its aid they have succeeded in reducing refractory ores which have hitherto resisted the action of the most intense heat attainable. Among these is alumina, which, with the exception of silicic acid and lime, is the most common constituent of the earth's crust. It occurs in 195 species of minerals, and when combined with oxygen and silicon, forms clay. Its richest ore is corundum, which is 54 per cent. of metallic aluminium and 46 per cent. of oxygen. Till 1869 the only sources of this mineral were a few river washings in India, and it cost from 6d. to 1s. per pound. But in that year Mr. P. Thompson found Northern Georgia an inexhaustible mine of corundum in the Crysolite Serpentine, and many other sources have been since discovered. Its present value at the mines is 2s. a ton, and the cost of the ore at the works is about 4s. per ton of metal. In Europe, where the process is being introduced, it is probable that manufacturers will look to using alu-

mina, artificially prepared from cryolite, or from Kynaston's sulphate of alumina.

Other metals, such as boron, sodium, potassium, calcium, magnesium, chromium, and titanium have all been reduced from their oxides by means of carbon, and the first of these has a very marked effect upon copper, increasing its strength to 50,000 lbs. or 60,000 lbs. per square inch, without diminishing its conductivity. Another metal which can be obtained is silicon. This is largely used on the Continent in the manufacture of telephone wire, and, like boron, gives great additional strength to the metal. What will be the ultimate effect upon chemical science of the introduction of the furnace it is impossible to say, but it promises to be a key to a crowd of difficulties which have hitherto resisted all attempts at solution. A furnace is being erected by Messrs. Allan & Co., at the American Tool Works, Antwerp, and if the prognostications of Messrs. Cowles that aluminium can be sold at 20d. per pound be fulfilled, it will require hundreds of works to supply the demand. At this price aluminium would be as cheap, bulk for bulk, as copper at 6d. per pound, while there is scarcely a purpose for which it is not superior. As a conductor of electricity it would replace galvanized wire at once, and in all culinary and domestic purposes it would be cheaper and better than either tin or copper. It is impossible to run through the entire list of purposes to which aluminium is applicable, but two which suggest themselves most naturally are torpedo boats and dirigible balloons. In the former every ounce of weight is considered, and cost is of no moment compared with speed. What a change would be wrought in the design and construction of these vessels if the weight of the engines, boilers, hull, or fittings could be reduced by two-thirds. As to balloons, no one would dare to speak confidently, but if the problem of aerial flight is ever to be solved, it is probable that the introduction of aluminium will be the chief agent in the matter. For the present we must wait to see if the promise of pure aluminium at a cheap rate will be fulfilled, and when it is, we shall enter on a new stage of the material development of the world.—*London Engineering.*

An Improved Coke Oven.

The recovery of products of distillation, heating gas, and coke from coals of little value is attracting considerable attention. It will be readily understood that at the present time, when coal tar can almost be had for the mere trouble of carrying away, that those carbonizing operations will be the most likely to pay that have for the principal object the production of coke for metallurgical purposes, in which operations tar may be regarded as a mere by-product. Ammonia, which is often obtained in larger quantity from those coals that are least capable of yielding tar and gas and which always pay at least fairly well for its recovery, can be looked for in those poorer fuels even, that are unsuitable for the gas manufacturer and the tar producer. Coals of too slight a bituminous character to serve for gas making, which are in short, better adapted for steam raising than for that purpose, are not only rich in nitrogen, but on distillation yield that nitrogen very largely in the form of ammonia. It would seem not improbable that the explanation of the large returns of sulphate of ammonia obtainable from such coals, though not very sensibly richer in nitrogen than the more bituminous gas coals, is to be found in the fact that, the tar being far less in quantity than that obtained from the gas coals, and also being very thick in character and so poor in oils, the nitrogen which would in bituminous coals have gone to form organic nitrogen bases of the pyridine and leucoline series, besides other nitrogen compounds, yet, not understood, has simply had no option, as it were, but to pass off as ammonia. However, in coking poor qualities of coal, coal dust, slacks, &c., it must be remembered that though a solid or good-looking coke may be obtained, it is open to question, until the contrary be proved by chemical analysis, that this coke will not be rich in sulphur, for coals of the poorer kinds are generally very pyritic. The object of the patentee, H. Stier, is to economize fuel by utilizing the gas obtained from the poor coals in question to fire the ovens. This he does by an arrangement of such a kind, that alternately in the one chamber a gas of the oven in gasification takes place by production of heating gas, or by complete combustion; in the other chamber, a destructive distillation in closed space is effected by the heat furnished by the first chamber.—*Coal Trade Journal.*

To Grade Wages.

There is reason to believe the effort making in Indiana to grade wages according to the thickness of the seam will be successful. The state is divided up into districts. The block coal region is known as the first, the bituminous coal regions immediately surrounding it is the second and the mines in Sullivan and Green counties are in the third. At present the price for mining throughout the first is 80 cents per ton for coal four feet thick, except in the case of the Nickel Plate mine, where a scale has been agreed upon depending upon the thickness of the vein. The Nickel Plate miners claim that they are in substance working at the Columbus scale, while the other miners claim they are not. The miners submitted a scale some time ago to the operators, which had for a basis 80 cents per ton for a three-foot and one half vein, and an increase and decrease in this price according to the variations in the thickness of the vein.

IN ALABAMA.

Improvements That Are Progressing at Coalburg Colliery.

The Coalburg Coal and Coke Co. is making extensive improvements in and around its mines. Fifty more coke ovens are being built, making in all one hundred and twenty-five. E. M. Tutwiler, mining engineer and superintendent, has commenced preparations for putting in the endless rope system. The company has three drifts, No. 4, 5 and 6, all of which are connected. All the coal is to be brought to No. 4 drift, where the engine will be located. There are now used about twenty-five or thirty mules, which will then be done away with, reducing the cost of hauling 6 to 8 cents per ton. About nine hundred yards from the mouth of No. 4 drift they are sinking an air shaft 6 x 8 feet, which will be completed this month, when a furnace will be constructed. This will cut off about nine hundred yards that the air had to travel to the present outlet. This promises shortly to become the model colliery of the South.

It is only a matter of time when Alabama, like other States, will have to have its mine inspectors, and when it does, Mr. E. M. Tutwiler will be likely to take rank among them.

Yours, etc.,

CORR.

Coalburg, Ala., Aug. 4, 1886.

The Coal Trade.

From Seward's Coal Trade Journal.

Anthracite transactions foot up to something quite respectable and there is a realization of the hopes expected—this was delayed a month simply because of bad management on the part of some of the producers. We are hardly likely to see an average result in dollars and cents equal to last year's, but there is no doubt of the ability to market a heavy tonnage. It is remarkable how quickly the current changes; now all the reports which come in are of better demand, firmer tone and a tendency to higher prices. There are still some operators who are quick, when engaged in competition for trade, to reduce prices, but they do not move so quickly when the market turns the other way. Inquiries for coal are really more numerous than they were, and this may be due to the idea that another advance in the circular rates is likely soon to be announced. Philadelphia reports are remarkably buoyant and the talk is now of a large output for September, but it will be well not to make the output much larger than agreed upon for August. It will be noticed from our reports that the receipts at Chicago in seven months are some 120,000 tons greater than in an even period of last year. The report from the eastward is that the companies have held to advanced rates and individuals are selling little or no coal at cut prices; this is a good sign and should lead to better things than have prevailed in that market. In the interior at various centres, the movement in Anthracite is increasing steadily as the orders from the country dealers begin to come in more liberally, and some of the producers are reported to be already sold up on August production. The new coal coming forward is being absorbed, and some of the corporations have had to draw upon their stocks at tide-water to fill old orders. As we have before noted the apparent increase on September first, is not likely to be large.

On the Continent.

The trial borings, sinkings and drivings which are in progress in the north of France are rapidly extending the boundaries of the known coalfields of that important locality, and rendering possible a continued development of the coalmining industry. The Aniche company have just struck two fine seams of gas coal. The measures are highly inclined in that part, but the depth is inconsiderable, and the coal may be worked cheaply. Some time ago an order by the French Minister of Industry was issued to the owners of all collieries having but one shaft to provide at once a second way of communication with the workings. These owners being for the most part ill-provided with capital, and finding it hard in present circumstances to earn a profit on the money already invested in the mines, are seeking a way of evading the order. Among patents recently taken out in Germany, there is one, granted to the Gutfloßungshutte colliery company at Oberhausen likely to attract attention from its novelty. Also, it is equally likely to attract attention from its merits, if the information received is correct. The invention relates to the valve mechanism of winding engines, and is designed to give complete control over the starting and reversing gear. This end is attained by employing for the controlling motion the water under pressure in the boiler instead of the steam. The sufficiency of mere manual labor to entitle a man to honorable distinction has of late been recognised in several ways by the French Government. The president has now issued a decree authorizing the Minister of Commerce and Industry to confer the right of wearing a medal for thirty years' service with one employer. Coalminers will get the largest share of these medals.

THE COKE TRADE.

BUSINESS NOT SO DULL THOUGH THIS IS THE DULL SEASON.

CONNELLSVILLE, Pa., Aug. 7.—At no time in the history of the coke trade has business been better at this season of the year. It is during July and August that furnaces blow out to give the men a rest and the stacks an overhauling during the hot weather. There is usually, therefore, a marked depression in the coke trade at this time, but no such depression has shown itself thus far this year. The furnaces have not blown out, and show no disposition to do so; on the other hand, a number are reported coming in. The Edith furnace, on the Lower Allegheny, which has been idle for several years, has blown in, and the Stewart Iron Company will light the fires in their Sharon furnace September 1st; it is also rumored that Youngstown parties will start the Calumet furnace at Chicago, which has been idle for five or six years because of financial entanglements. Then the new furnace at the Edgar Thomson steel works is almost completed and will blow in soon. The iron trade is not improved any, but the fact that it holds its own during the dull season is encouraging. The steel trade is good, there being a good demand for rails. These facts, together with the further facts that the region is running all but full and that there is a ready market for all the output, is a reasonably safe guarantee that trade will not decrease any this fall.

The total shipments last month were 25,400 cars, or an average daily shipment for the 25 working days of 1,016 cars. Of this the Syndicate shipped 18,000 cars and the outside producers 7,400 cars. The syndicate shipments thus fall nearly a thousand cars short of those for June. This is accounted for in the fact that owing to the general suspension of work to celebrate the Fourth and to attend the funeral of President Hart of the Amalgamated, and to petty strikes and lock-outs, the output was reduced to the extent noted. The shipments were consigned as follows: To the west, 12,575 cars; to the east, 6,510 cars; to Pittsburgh and the rivers, 6,215 cars. Almost one-half the output went west while the balance was very nearly divided between Pittsburgh and the east. Some furnaces are stocked just now and shipments are restricted by the railroads. The output, except B. & O's. The shortage on this line is rather surprising, as it has never failed to have plenty of cars heretofore. The car supply is helped out by new individual cars, of which there are now 1,150 running between Pittsburgh and Chicago alone. They are owned by the Union Steel Company, the Joliet Steel Company and the North Chicago Rolling Mill Company. The former has just put in 400 new cars of the latest improved pattern, having a capacity of 50,000 pounds each.

There are but two works reported idle this week on account of strikes, namely, Pensville and West Leisenring. The men at the latter works came out yesterday for some unknown cause; the Pensville men struck some weeks ago because Operator Sherrick refused to advance the wages of a pumper 25 cents per day and date the advance back a month. He discharged and paid all the men, and says he won't start again until after harvest. There was a brief strike at Leisenring this week, by the trapper boys and drivers. The matter was settled by a promise of shorter hours. The strike at Oliphant and Kyle has been compromised, and the men at Wheeler and Morrell are working, pending a settlement. Some trouble is also reported at Jintown, but it is to be settled by arbitration. Elsewhere the labor is quiet and running full. The pool seems to have removed the restriction as to the erection of new ovens. West Leisenring is putting up 85; Trotter, 35; Tip Top, 50; Fort Hill, 200; Mammoth, 300; Conneltsville Central Coke Company at Tarrs, 100. At the Nellie works, 42 ovens have been completed, making 142 in all. Several sales of coal land are also reported. The H. C. Frick Company have bought the Phillips coal, near Uniontown, 125 acres at \$200; the Joe Meyers farm, near Mt. Pleasant, coal and surface, 200 acres, at \$275.

Of the 10,780 ovens reported available in the region, there are this week 995 idle, classified as follows: Pool ovens 636; furnace ovens, 232; old Mt. Braddock works, idle for several years, 127. Of the Frick works, Trotter, Davidson, Standard, Valley, Morewood, Tip Top, Summit, White, Eagle, Foundry, Morgan, Frick, Henry Clay, South-west, Dillingier and American are full, and Fountain is idle. All the McClure works, namely, Coalbrook, Painter, Diamond, Hazlett, Bessener, Enterprise, Union, Mayfield, and Donnelly, are full; also the Schoonmaker works, Kedron, Jintown, Sterling and Alice. Leisenring is running 450 out of 500 ovens, and West Leisenring is idle on account of a strike. Of the Coke Producers' Association, Fairchance, Oliphant, Kyle, Parrish, Atlas, Anchor, Franklin, Clinton, Home, Dexter, Mullen, West Overton, Cora, Buckeye, and Star, are running full; Pensville, is idle and both Percy and Uniondale have 12 idle ovens. Of the furnace ovens, Oliphant, Leith, Stewart, Hill Farm, Morrell, and Wheeler, Charlotte, and Kifer, and Tyrone works are running full; Lemont is running 100 out of 152 ovens, Youngstown 80 out of 240, and Mahoning is idle. Of the independent ovens Moyer, Fort Hill, Jackson, Clarissa, Nellie, Emma, Hecla, Mutual, and Mammoth are full. The Mt. Braddock works continue idle.

Mechanical.

A new vulcanizable gilding rubber covers a sheet of vulcanizable rubber to which coatings of chloride of silver have been applied, together with a novel process of applying such coating, more especially for use in making dental plates.

Take any saw running constantly in one direction, and after having made say ten million revolutions, examine its particles at a newly broken surface with a microscope, and it will be found that every molecule of iron composing that saw has been displaced.

A new shank lasting apparatus has jaw arms with pivoted jaws, and links pivotally connecting the end of the jaw arms to allow relative longitudinal movement with other novel features, the invention being an improvement on a former patented invention of a similar tool.

A steam engine has been patented by a Mr. J. S. McCoy, of Brooklyn, N. Y., wherein the slide valve is carried by and within the piston, around which a steam space is formed in the cylinder so that the piston is rendered almost entirely frictionless, the steam inlet port to the cylinder being immediately below the piston, whereby the pressure of steam will counteract the weight of the piston.

To etch your name on steel tools, proceed as follows: Clean thoroughly of all grease, and then spread a thin coat of beeswax or paraffine on it at the place where the name is to be. This must be as thin as possible. Then, with a sharp needlepoint, write through the wax to the steel. Paint this over with a mixture of nitric and muriatic acid, in the proportion of six to one respectively, and when bubbles cease to rise the work is done. Wash in strong soda water.

He Had to Do So.

The Detroit Free Press tells this. Among the excursionists sitting on the City Hall steps yesterday noon to luncheon were a young fellow who had a wide-awake look, and a girl in a pink dress who insisted on holding his hand and lopping over on his shoulder. Two or three gentlemen observed the situation and halted for a second look. Their smiles were noted by the young man, and he released himself and came over to them and said:

"Gentlemen, let me explain. Did either one of you ever live in the country?"

"No," they replied in chorus.

"Then you don't understand the country girl. She requires to be loved after a certain fashion. She wants a practical realization of the fact that you love her. I might tell her how much I adored her, burn up my eyes and tell her until dark, but she wouldn't realize me a tenth part as much as if I put my arm around her and let her head drop on my shoulder. The one is talk, the other cold facts."

"Exactly, that's so," remarked the gentlemen.

"When a city girl is in love, she conceals the fact, or tries to. The country lass is only too proud to give it away. You saw us sneezing hands. You've got to squeeze a country girl's hand as often or she'll imagine you have got mad at something."

"Exactly, that's so," observed his auditors.

"You may have noticed that I fed her crackers and she fed me cheese. It must have looked very silly to you, but that's another phase of country courtship. If you claw off, the girl would imagine that you felt above her. I tell you gentlemen, I've been counting girls for the last ten years, and I'm giving you a pointer that there is only one correct way and this is it."

"Exactly, that's so," replied the gentlemen in chorus, as they lifted their hats to the girl and walked off.

Another Cattle-Raising Field.

B. Lorenzo Hill, a wealthy American who is engaged in cattle-raising in Uruguay, and who visited this country last fall, after nineteen years' absence, has written to a friend the following information.

The importation of pure-bred animals to the River Plata is gradually increasing, and is worthy the attention of the stock-breeders in the United States. In the recent rural exhibitions at Montevideo and Buenos Ayres, it has been proved beyond a doubt that imported blood flourishes in these countries, surges, in fact, the source from which it springs, as this mild climate and rich nutritious pasture surpasses the raw, cruel climate, ungrateful soil, and inferior pasture of England, whence our pure blood mostly comes. In cattle, Herefords and Durhams are the favorites, and are being brought over of late in considerable numbers. In March 500 heifers of high repute were imported from England by one estancia alone. Among them was the famous heifer Hilda, bred by Turner of Penbridge, considered one of the best 3-year-olds in England. According to the census of 1881 the Province of Buenos Ayres alone then had 718,000 Mestiza (horned cattle), crossed with Durham and Herefords, besides 4,000,000 head of creole or native breed. On my recent visit to the United States I saw some superb types of both Durham and Hereford. Surely there must be some to spare that would successfully compete here with our English importations. The merino rams brought from Vermont last year by Mr. E. C. Eells, the first and only ones ever imported from the States, were readily sold at high rates, and have given satisfaction, and will undoubtedly create a demand in the States.

With peace secured and a consequent return of confidence, business begins to improve. The imports of Uruguay, at official valuation, were in 1885 \$28,275,000, or 3 per cent above the previous year; exports \$25,253,000, or 2 per cent above 1884. Of this trade England had \$12,267,000; France, \$7,680,000; United States, \$6,415,000; Brazil, \$5,508,000; other countries, \$18,458,000. Total, \$50,328,000. The increase of trade with the United States is quite notable, having nearly doubled in one year, it being but \$3,358,000 in 1884, against \$6,415,000 in 1885. This is certainly very encouraging, as with all other countries, except England, in the same period, there was a falling off. The export of the live stock in 1884 was 124,000 head, against 204,000 head in 1885. The estimated Government resources of Uruguay for 1886 are \$14,000,000 and estimated outlay \$12,000,000.

Wealthy Owners of Gotham Realty.

The Goetts own forty-nine corner properties on Broadway. There are two brothers, Robert and Ogden, who got their possessions by inheritance from old Peter Golett, who was one of the queer characters of New York's early history. He lived in a tall house surrounded by a large yard at the corner of Nineteenth street and Broadway. It is still standing and belongs to his sons. In this yard he used to pasture a fine Jersey cow, whose milk was his principal food. He occupied his time in collecting his rents and investing his money in real estate. He could never be persuaded that Fifth avenue property would become valuable, but made all his investments along the line of Broadway. His two sons now live in fine houses far up on Fifth avenue, and the rentals from their property on Broadway are enormous. They have little facility for business. Their wealth is estimated way up in the millions, but would have been double or triple what it is if the elder Golett had invested on Fifth avenue. The palm for extensive possessions of real estate lies between the Rhinelanders and the Astors. The estimated value of these two families are \$50,000,000 to \$75,000,000 apiece.

A Healthful Rule.

Poet.—"Do you pay by length?"

Editor.—"Yes."

Poet.—"I have two poems here. One has two stanzas and the other eighteen. How much will you give for them?"

Editor.—"Ten dollars for the short one, and five for the long one."

Poet.—"I thought you said you paid by length."

"So we do."

COAL TO ADVANCE.

A FURTHER RISE IN PRICES PROBABLE NEXT WEEK.

We condense the following from the Philadelphia Inquirer of the 6th: The Anthracite companies are standing up to their price circulars far better than supposed and claim to be making no rebates or allowances. There is really a strong tone to the market. It is true there is not much inquiry, and the sales are smaller yet, but this is because the markets are full of coal.

There is little doubt that at the meeting of the representatives of the companies on Thursday there will be another advance ordered. The meeting will be held at F. A. Pott's office in New York. A quiet agreement has been entered into between the managers to restrict production and advance prices. It is proposed to fix the allotment for September at 2,500,000 tons, and by the time consumers have come fully to appreciate the fact that coal is going to be scarce, and advance prices will be ordered. The allotment will be fixed on August 20. Then, on or about September 1, prices will be advanced again. In view of this some of the interests do not think it wise to raise prices the usual twenty-five cents on Thursday, but to put it at fifteen. This would make circular prices at \$3.30 for broken egg and nut in New York harbor, and \$3.65 for stove. It is also urged that fifteen cents advance would be sufficient in September. It makes little difference to the consumer whether prices are advanced twenty-five cents at one time or whether it is done at two meetings, but frequent announcements that prices have been pushed up strengthen the market, and that is a great object to the companies.

There is a good city demand for chestnut and stove sizes, and the regular fall domestic business has started in. Manufacturing sizes are also in request, and the supply is short. The ruling prices for white ash, coal at Schuylkill Haven are \$2.60 for stove and \$2.35 for broken, egg and nut.

For Colds.

For Croup.

For Neuralgia.

For Rheumatism.

Doctor Thomas' Electric Oil.

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"Spent Fifty Dollars

In doctoring for rheumatism, before I tried Thomas' Electric Oil. I gave a 50-cent bottle of rubbing pain relief in one week. For burns and sprains it is excellent." Jas. Durham, East Pembroke, N. Y.

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You Can Depend On It.

For severe Coughs and Neuralgia of the head, I used Thomas' Electric Oil. This is certainly the best thing I ever knew for the relief of pain. I got it out of the house in never without it. Mrs. A. M. Frank, 277 Tupper street, Buffalo, N. Y.

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Speaks Right Up.

"Have tried Thomas' Electric Oil for croup and colds, and find it the best remedy I have ever used in my family." Wm. Kay, 570 Plymouth avenue, Buffalo, N. Y.

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Worked Wonders.

"My daughter was very bad off on account of a cold, and pain in her lungs. Dr. Thomas' Electric Oil cured her in twenty-four hours. One of the boys don't get on in one week. This medicine has worked wonders in our family." Alvah Pickney, Lake Mahopac, N. Y.

SWITHIN C. SHORTIDGE'S ACADEMY.

For Young Men and Boys, Media, Pa.

12 miles from Philadelphia. Fixed price covers every expense, even books, &c. No extra charges. No incidental expenses. No examination for admission. Twelve experienced teachers, all men, and all graduates. Special opportunities for rapid English, Scientific, Business, Classical or Civil Engineering course. Students fitted at Media Academy are now in Harvard, Yale, Princeton and the best colleges and Polytechnic Schools. 10 students sent to college in 1883, 15 in 1884, 10 in 1885, 10 in 1886. A graduating class every year in the commercial department of a Physical and Chemical Laboratory, Gymnasium and Ball Ground. 1500 vols. added to Library in 1883. Physical apparatus don't fail in 1883. At this seven churches and a temperance charter which prohibits the sale of all intoxicating drinks. For new illustrated circular address the Principal and Proprietor, SWITHIN C. SHORTIDGE, A. M., (Harvard Graduate) Media, Penna.

SEE THAT THE BOYS LEARN.

The Need of More Rudimentary Education Among the Boys of the Shops.

The general knowledge possessed by boys and young men in shops and factories is sadly less than it should be. The boys in question are often ignorant of the simplest principles of the work they accomplish day by day.

A well-known manufacturer remarked that the deficiency of knowledge among boys in his shop was something to be deplored. He had three bright boys about 16 or 17 years of age who seemed as intelligent as the average run of boys, yet the fact was developed that neither of the boys knew what was meant by the term diameter of a circle.

Two of these boys had worked in the machine shop for two years, and the third boy, who had recently begun work in the shop, was recommended as "understanding considerable geometry" when he applied for a position in this shop.

Two of these boys had done fine machine work for many months. They worked to micrometer measurements as a matter of course, and were able to bring stock to the desired size and shape within one-quarter of one-thousandth of an inch, yet these boys did not know what was the diameter of a circle.

It is generally supposed that any school boy knows all about circles, squares and their constituents, yet the school boy has been told these things, while the shop boy never heard of them. He is given a job; he is shown how to set lathe or machine in order to do that job, but never a word does he hear about the technicalities of the work, the reason why, or anything about the principle upon which depends the correctness of his work.

These boys learn to turn out a great quantity of first-class work, yet they don't know the first thing that will make them valuable as machinists, or which will advance them toward carrying on business for themselves.

Any manufacturer or any foreman is willing to tell a boy why such a thing is done if he has the least intimation that an explanation is needed or desired.

We need more rudimentary education among the shop boys than they are getting at present. It does not require much time to tell about the little things that occur in every-day practice, but it will not do to suppose the boys know all these points simply because they ought to know them. This is the way things have been going on, and this is what causes the present state of shop-boy knowledge. Many of the boys do not realize that there is a field of study for them which will prove more interesting than base ball matches, or even "going a-fishing." Let the boys once understand that they can learn lots of things beneficial to them from books. Let them be shown how to learn these things, and the technical school business will be outdone.

Some of the boys, it is true, would never learn, even with the best opportunity, but give them a chance, all the same, that, if the germ is there, it may have a chance to take root and grow steadily toward the light of knowledge.

Only a word or two will often start a boy to thinking that he can improve himself if he chooses, and fit himself for a responsible position. If the boy is ambitious, nothing more is necessary. He will take care of himself and learn as a weed grows.

Real good machinists, they say, are becoming scarcer every day, and real skilled labor is hard to find. The technical school is working out a stock of embryo engineers and artisans, but give the shop boy's thoughts a start in the right direction, and if he possesses latent talent to be of any use in the mechanical world, that talent will assert itself, no matter if he is doing monotonous machine feeding or general boys' work all around the shop.

Try the experiment of finding out what the boys know, and what they don't know. Help them to do a little thinking for themselves, and see how quickly they will acquire more knowledge, and use it intelligently for your benefit.

Many a boy is working in a shop who will never do anything but run the automatic machine, and be himself a part of that machine, but there are boys in the shop who don't know what is meant by the diameter of a circle, or the diagonal or a parallelogram, yet these same boys will expand into useful, intelligent mechanics, if you but once give them a start in the right direction.

A little time and trouble taken for the shop boys will not cost you much, but it will prove the best invested expenditure you ever made. Help the boys by letting them know how to learn.—*Mechanical Engineer.*

We recently heard it mentioned as an instance of good business capacity, that a man who five years ago was engaged in selling water wheels, was at the present time busy in selling steam-engines to run them. There is nothing like adapting oneself to altered circumstances.

California Air-Ship.

A new flying ship has been constructed in San Francisco which is thus described: The balloon vessel, which is completed all except the machinery, is 180 feet long, 43 feet broad; depth of car 12 feet; capacity of balloon (hydrogen), 182,000 feet; engines, 3; horse-power, 36; lifting capacity, 16,000 pounds; and total weight, 5 tons. Prof. Patterson calculates that when driven by its propelling power he can attain a speed of one mile a minute. The car is box-shaped, and is made of the lightest kind of ash.

It is divided into three compartments, a passenger compartment, each, forward and aft, and an engine boiler-room amidships. The balloon part is attached to the car so that an independent movement is prevented. The balloon is also divided into compartments, which prevents an accumulation of gas either at one end or the other, and thereby prevents a depression or elevation of either end. An automatic valve attached to each of the compartments permits the escape of the gas in case of expansion, announcing its exit by means of a whistle. A parachute attached to the upper deck and under the balloon is so arranged that in case of necessity it can be thrown out in a moment by the simple movement of the lever. Running the full length of the hull of the machine are two keelsons, for stiffening purposes. Four pairs of wheels for landing purposes are affixed underneath the hull in such a manner as to prevent jolting when landing, spiral springs and rubber buffers being arranged for that purpose. Two lifting screws, made of strong steel frames of green hogskin stretched thereon and then dried, revolve beneath the hull, while a propelling screw, constructed in the same manner, is rigged astern to send the vessel ahead. In order to steer the machine this screw rod works through a swivel, the engine being moved one way or the other by means of a crane, in which it hangs. Water in sufficient quantities for steam-making purposes for two days can also be carried.

Dry Rot in Timber.

In a late number of a German technical journal, Herr Goldt gives a treatise on the causes of dry rot by the light of a summary of known facts illustrative of the subject. He is of opinion that the problem is still to be solved; and, in view of the occurrence of dry rot under some very peculiar conditions, suggests that the germs of the disease may exist in the living tree. In no other way can he explain the decay of wood from this cause when it was apparently dry and sound, and properly used. In Russia there are entire forests from which no timber is now taken, experience having shown that it has always been attacked by dry rot. Sometimes a strong solution of common salt, applied while hot, has been found an efficient preservative of timber.

The necessity of airing timber in its built-in position is, of course, universally recognized. Professor Farsky, of Tarbor, Bohemia, has found that salicylic acid is a preventive and cure for dry rot. At first the acid was used in a dry form, but lately great success has been achieved with a solution of 5-28 ounce of salicylic acid in 0-22 gallon of alcohol, and afterwards diluted. This solution has efficiently protected a floor 800 square feet in area from the spread of dry rot, and has removed it from the spots where it seemed to have established itself. The crude acid may be used for this purpose, and its action as an antiseptic is heightened by the admixture of a little carbolic acid. Professor Poleck finds that wood out of water in its soaked condition is very susceptible to dry rot, which does not appear when the timber is kept perfectly dry or thoroughly wet. A somewhat high temperature and dampness are almost, though not entirely, essential to the propagation of the dry rot mycelium. It is in contemplation to determine by experiment whether timber cut in summer cannot be rendered safe against dry rot by the removal of the bark, protracted drying, and prolonged steeping in water.

Uniform Railroad Signals.

In speaking of a recent convention of railroad agents in Cleveland, Robert Pitcairn, according to the *Pittsburg Gazette*, says: "The meeting at Cleveland this week was another of a series that our committee has been holding. We have before us the rules governing the movement of trains from all countries in the world, and from the mass of matter we hope to evolve a system of rules that will answer the purposes of civilization. As it now is a green light on a train on one road doesn't mean what it would on a train on another road. 'A lantern swung back and forward on one road would back a train, while on another it would start it forward. A man coming from the Baltimore & Ohio road to work for the Pennsylvania railroad has to learn the signals and manner of running trains, and knowing both is apt to get confused and consequently to cause confusion and not infrequently destruction. What we are trying to do, in a word, is to formulate a series of rules for locomotion that will be national in character. We want to have it that a man leaving the Pennsylvania road may go to work on the Mexican Central or the Southern Pacific without embarrassment to himself or the company hiring him. We have settled the matter of time in this country so that railroads can operate without confusion. This committee was appointed by the same convention, and is another movement toward simplifying and making uniform the locomotion rules of the country."

Beware of frauds.—Be sure you get the genuine Dr. Thomas' Electric Oil. It cures Colds, Croup, Asthma, Deafness and Rheumatism.

POWER OF FUEL.

A Scientific Diagnosis and Determination of Its Caloric Strength.

Mr. William Thomson, in a paper read before a Manchester (England) scientific society a short time since, described an apparatus recently devised by him to determine the heating power of different coal samples. The method which he follows consists in burning the coal in oxygen. The apparatus, briefly described, is made up of a stand furnished with four upright brass springs. These are strips of brass fixed to the stand at the bottom and curved upward and inward. In this stand is fitted the bowl of an ordinary clay tobacco pipe rather less than $\frac{1}{2}$ inch internal diameter by $\frac{1}{2}$ inches long. This is used as a stand for a small platinum crucible $\frac{1}{2}$ inch diameter by $\frac{1}{2}$ inches long, because the clay is a non-conductor of heat and would not injure the platinum when heated to redness. Into this platinum crucible is introduced 1 gram. of coal in a fine state of division, which is ignited, after being placed on its stand, by a fuse, and the whole covered by an inverted wide glass test-tube 6 inches long by $\frac{1}{2}$ inches diameter, to the bottom of which was attached a piece of narrow tubing 1 inch long by $\frac{1}{2}$ inch in diameter. Over this tube is drawn a piece of India rubber tubing, the free end of which is turned over on itself, and through this rubber is passed a glass or thin copper tube, preferably the latter, terminating with a stop-cock. The fuse is prepared by soaking two or three stands of ordinary lampwick in nitrate of potash solution and drying. About $\frac{3}{4}$ inch of this fuse is placed upright in the mixture.

When the fuse is ignited the mouth of the test-tube is pushed over the brass springs, thus inclosing the platinum crucible containing the coal, on the diving-bell principle, and the whole is then sunk into the cylinder, containing either 1934 or 2000 gram. of water, the temperature of which has previously been taken by a delicate thermometer. A stream of oxygen from a gas holder or gas bag is then allowed to flow slowly through the test-tube downward, making its escape at the mouth and bubbling through the water. It is necessary to commence the combustion by having the movable tube which penetrates the bottom of the test-tube drawn well up, so as to have a complete atmosphere of oxygen in the test-tube until most of the volatile matter of the coal is consumed. The movable tube is then gradually pushed down till it comes to the mouth of the platinum crucible; a slow circular movement is then given to it by the hand till the whole of the fixed carbon of the coal is consumed, which is rapidly done under the stream of oxygen impinging on it. The ash is then left as a number of fused globules, many of them adhering to the crucible, having been completely fused by the intense heat of the combustion. The water is then allowed to enter the tube and comes in contact with the hot crucible and tobacco-pipe support and the entrance tube for the gas to abstract the heat left in them; the whole of the water is then well mixed and the temperature again taken, the difference between the two temperatures being the heat given to the water by the combustion of the coal. Mr. Thomson has found that the temperature of the water is practically not altered by passing about 3 gallons of air or oxygen through it, that being in excess of the quantity required to burn the coal, between 11 and 2 gallons being actually required.

By this method it is not necessary to deduct or add to the result obtained. The rise for each gram. of good coal is somewhere about 6° to 7° F. for the 1934 gram. of water, that being equivalent to about 11,500 to 13,500 units of heat. Graphite burns away quite easily in the oxygen apparatus. During the time the experiment is being made, Mr. Thomson finds it necessary to have the cylinder containing the water resting on three pieces of cork in a loosely fitting vessel of bright tinned iron plate, having a slit 7 inches long and 1 inch wide cut down one side, through which the combustion can be observed. This vessel practically prevents loss of heat from the water if it is above the temperature of the surrounding air, *vice versa* if the temperature of the water be lower than that of the air, but Mr. Thomson prefers to have at hand a large supply of water which has been exposed to the atmosphere for some hours, in order that its temperature may become as nearly as possible the same as that of the air.

The earth worm is a humble laborer whose services are not appreciated. He needs for his support only the poorest food. He eats the earth in order to assimilate a little of the soil that it contains. He harns no root, and only uses a little of the material in which he dies. This indefatigable and silent laborer brings the earth to the surface from below, and the pits and galleries which he makes allow heat and moisture and the atmospheric agents to penetrate the earth thus rendering the temperature consequently more favorable for the growth of the roots of trees and shrubs. As he enters these galleries he draws in with him leaves and mosses, and the very important results of this burying them is to hasten their decomposition into mould. The earth worm drains, cultivates and enriches the soil, so one must not destroy him.

Government Timber Land Regulations.

The following rules and regulations governing the removal of timber from the public lands were promulgated from the Interior Department on the 6th inst.:

By virtue of the power vested in the Secretary of the Interior by the first section of the act of June 3d, 1878, entitled "An act authorizing the citizens of Colorado, Nevada, and the territories to fell and remove timber off the public domain for mining and domestic purposes," the following rules and regulations are hereby prescribed: First. The act applies only to the States of Colorado, Nevada, and to the territories of New Mexico, Arizona, Utah, Wyoming, Dakota, Idaho, and Montana and other mineral districts of the United States not specially provided for. Second. The land from which timber is felled or removed under the provisions of the act must be known to be of a strictly mineral character, and that it is "not subject to entry under existing laws of the United States, except for mineral entry." Third. No person, not a citizen, *bona-fide* resident of a State, territory, or other mineral district provided for in said act, is permitted to fell or remove timber from mineral lands therein, and no person, firm, or corporation felling or removing timber under this act shall fell or dispose of the same or the lumber manufactured therefrom to any other than citizens and *bona-fide* residents of the State or territory where such timber is cut, nor for any other purpose than for the legitimate use of said purchaser for the purposes mentioned in said act. Fourth. Every owner or manager of a saw-mill, or other person felling or removing timber under the provisions of this act, shall keep a record of all timber so cut or removed, stating time when cut, names of parties cutting the same or in charge of the work, and describing the land whence cut by legal subdivisions, if surveyed, and as nearly as practicable if not surveyed, with a statement of the evidence upon which it is claimed the land is mineral in character, and stating also the kind and quantity of lumber manufactured therefrom, together with the names of parties to whom any such timber or lumber is sold, dates of sale and purpose for which sold, and shall not sell or dispose of such timber, or lumber made from such timber, without taking from the purchaser a written agreement that the same shall not be used except for building, agricultural, mining or other domestic purposes within the State or territory; and every such purchaser shall further be required to file with said owner or manager a certificate under oath that he purchased such timber or lumber exclusively for his own use and for the purposes aforesaid. Fifth. The books, files, and records of all the mill men or other persons so cutting, removing, and selling such timber or lumber, required to be kept as above mentioned, shall at all times be subject to the inspection of the officers and agent of this department. Sixth. Timber felled or removed shall be strictly limited to building, agricultural, mining, and other domestic purposes, within the State or territory where it grew. All cutting of such timber for use outside the State or territory where the same is cut, and all demands therefor outside of the State or territory where it is cut, is forbidden. Seventh. No person will be permitted to fell or remove any growing trees of any kind whatsoever, less than eight inches in diameter. Eighth. Persons felling or removing timber from public mineral lands of the United States must utilize all of each tree cut that can be profitably used, and must cut or remove the tops and brush, or dispose of the same in such manner as to prevent the spread of forest fires. The act under which these rules were prescribed provides as follows: "Section 3. Any person or persons who shall violate the provisions of this act or any rules and regulations in pursuance thereof, the Secretary of the Interior shall be deemed guilty of a misdemeanor, and upon conviction shall be fined in any sum not exceeding \$500, and to which may be added imprisonment for any term not exceeding six months." Ninth. These rules and regulations shall take effect September 1st, 1886, and all existing rules and regulations heretofore prescribed under said act, inconsistent herewith, are hereby revoked. (Signed)

WILLIAM A. J. SPARKS,

Commissioner.

L. Q. C. LAMAR, Secretary.

Approved August 5, 1886.

No More Foreign Steel.

The shipment of foreign steel billets and blooms to Pittsburgh has stopped. Of the thousands of tons to be brought into this country one thousand were received, and they were so very inferior to the same articles manufactured in this country that the manufacturers at once cancelled their orders, and the further shipment of the foreign material was at once stopped. The last order was countermanded during the past week. The representatives of the foreign product created a regular furore among the manufacturers of this country. As many as three or four representatives of foreign iron works were in this city at one time. They represented that the bill could be delivered at the various mills of this city much cheaper than the home article, and they claimed for it a great superiority over the American products. Between January and March Pittsburgh manufacturers gave orders for 10,000 tons. The delivery commenced only a few weeks ago, and there are cargoes of it now in Philadelphia and New York, and so soon as the first experiment was made its inferiority was plainly shown, and the manufacturers wished they had been satisfied with the American product. In the meantime the price of American billet and blooms had dropped from \$34 to \$30 per ton, and the foreign steel can not be brought into the country at these figures.

The Dangers of Dust.

Darkness, damp, and dust are potent agencies of disease. Everybody recognizes this; but how many fail to adopt its precepts! If there be sermons in stones, surely the Summer dust and its dangers would prove a fruitful subject for medical discourse. There is as great a difference between London and country dust as there is between the corresponding muds. Pulverized matter would be harmless enough if it were deprived of its physical property of ready diffusion. The atmosphere is laden and swarms with particulate matter of highly complex nature. Its chief peril to living beings resides in the organic constituents; largely this organic material consists of minute forms of life in a state of latency, only waiting for a spell of heat and moisture and a favorable amount of light, or it may be darkness, to awaken it into activity. The habits of individuals in every class of society, including the "masses," are not calculated to diminish, but rather to augment, the amount of organic matter in our atmosphere. Mucus, saliva, and humor, popularly known as "matter," must be discharged from the mouth and nostrils to the extent of many gallons daily, and not a little of this comes from infective sources while we venture to think that the bulk of it mingles with the dust of our streets and courts. If, as seems not unlikely, consumption is largely caused by "germs," then a very ready theory may be advocated concerning the mode in which contagion is caught. Who can estimate the amount of mischief that the shakings of mats may have caused? How many young girls early in the morning on their way to business have, so to speak, recoiled their death blows while inspiring, all unconscious of harm, some of the clouds of dust that always greet them? Who can tell? The statement of this danger and nuisance is a difficulty that almost seems insurmountable. Much may be done by personal habits of prevention.—*Lancet*.

Pittsburg.

From the American Manufacturer.

The Ohio river continues too low to permit the movement of either loaded or empty craft, and the mines along the Mounongahela are still practically all idle. As a result of these conditions prices at Cincinnati and Louisville are a little higher—about a fourth of a cent per bushel. At New Orleans there is no change. In that market stocks are so large that without reinforcement they would last till next April. The Kauwaha operators have not yet invaded that market, and Alabama coal, though so near, still offers but little opposition to the Pittsburgh product. As the railway mines there is no material change, though should trouble arise in the Hocking Valley, Ohio, as is threatened, there would likely be an increased demand. As it is, the output continues fair for the season.

We quote as follows:

PRICES AT PITTSBURGH.

River, wholesale, on board.....3½¢@4½¢cts. per bushel.
Railroad.....4½¢@4½¢cts. per bushel

AT CINCINNATI.

River wholesale, on board.....5½¢@6½¢cts. per bushel.

AT LOUISVILLE.

River, wholesale, on board.....5½¢@6½¢cts. per bushel

AT NEW ORLEANS.

River, wholesale, on board.....25¢@26½¢cts. per bbl.

Bushels are rated among dealers here at 76 lb., 26½ bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke—All the ovens continue in operation, and consumptive requirements take all the product, while new ovens are in process of erection. Blast furnace; \$1.50, f. o. b. cars at the ovens; foundry, \$1.75 crushed, \$2.25.

Drafts in Locomotives.

Those who are familiar with the principles of the modern locomotive know that the present method of producing a draft of air through the furnace is very imperfect. Back pressure in the cylinders, by contracted exhaust nozzles, has been the cause of a fearful waste of fuel, ever since Stephenson's "Rocket" started on her trial trip. Railroad men are generally too busy to stop and experiment, so the problem will have to be taken up by someone outside their circle. Most experienced railroad men concluded, years ago, that locomotive-builders were contracting the nozzles of the engines too much, and lately inventors have been experimenting with the extensive smoke-box, baffleplates, screws, etc., and have discovered that by giving the principles of induced currents a more thorough research, the parts in the smoke-box and stack could be given a form better suited to a larger area in the nozzle openings, and produce a better draft with much less back pressure in the cylinders, and at the same time relieve to a great degree the emission of sparks. These are real improvements, but cannot be considered perfect.

Dr. Cliechester A. Bell claims to have discovered that a falling jet of water, or a flame of gas burning in a room, mimics, echoes, and carefully reproduces every word spoken and every sound uttered in a room. Dr. Bell has found that when a couple of friends join in a conversation in the drawing-room of an evening, the gas which burns above their heads repeats every word they say.

Philadelphia.

Ledger.—The only matter that is new in the anthracite coal trade is the advance of 15 and 25 cents per ton ordered by the New York companies last week. Just why another advance was made upon the last previous one is not exactly clear. When the advance in prices for Anthracite to go into effect upon August 1st was made, the announcement being also made at about the same time that the output of coal this month would not exceed 2,500,000 tons, it was expected that the coal trade would be stimulated and increased sales effected thereby. During the first week of the current month, as was expected, there was a considerable stiffening in prices and a general improvement in the trade noted. Last week, however, the coal markets were not so active nor were prices quite so firm, as they had been in the previous week. There was also less inquiry for coal, and, as both dealers and large consumers know very well that there is no immediate prospect of a coal famine, they are not likely to be secured into placing contracts or making large purchases by any unwarranted advance in prices made by the New York companies. At present there is no "snap" to the business in Anthracite, but as September approaches the coal operators and shippers appear to be growing more sanguine over the outlook for the fall trade. Already the idea of limiting the production of coal in September is talked of in order to stiffen prices and induce buyers to place their orders now. But even if there should be had a tacit "understanding" between the coal corporations, that the output for September be fixed upon at less than last year's allotment, it is not likely that any of them will strictly confine themselves to their respective percentages if they can sell more coal than the quantity allowed by their "understanding."

The total amount of Anthracite coal sent to market for the week ending August 7, as reported by the several carrying companies, was 542,048 tons, compared with 588,085 tons in the corresponding week last year, an increase of 59,319 tons. The total amount of Anthracite mined thus far in the year 1886 is 17,548,705 tons, compared with 16,126,917 tons for the same period last year, an increase of 1,421,788 tons. The following statements give the gross tonnage of each of the leading coal carrying companies for the week ending August 7, and for the year to same date, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R. R.....	299,826	8,244,821	7,664,846	1,579,975
Lehigh Valley.....	131,431	4,149,343	3,742,809	406,534
D. and Western.....	84,550	2,841,721	2,471,432	370,289
Shenandoah.....	11,639	444,702	417,907	26,795
Utah and N. J.....	30,179	935,484	961,005	25,521
Penn. Coal.....	36,370	789,028	117,947	1,701
Del. and B. R.....	2,355,811	2,027,135	1,936,362	92,773
Pa. and N. Y.....	39,966	1,168,978	945,852	223,126
Cleaveland Pa.....	46,227	1,204,567	1,753,611	549,044
Fun and B. R.....	402,738	368,498	342,266	26,232
Nor. and W. Va.....	469,190	322,897	114,293	

The Pennsylvania Railroad reports that the quantity of coal and coke carried over its lines for the week ending August 7 was 277,055 tons, of which 208,548 tons were coal and 68,471 tons coke. Of this weekly tonnage 201,674 tons originated on the main line of the Pennsylvania Railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 8,848,038 tons, of which 6,841,901 tons were coal and 2,006,137 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading Railroad reports that its coal shipment for last week, ending August 14, was 300,000 tons, of which 39,500 tons were sent to and 44,000 tons shipped from Port Richmond, and 36,500 tons were sent to and 38,000 tons shipped from Elizabethport. Vessels are reported in fair supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 85c. and 90c. and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending August 7 were 67,940 tons, and for the year to that date 1,181,986 tons, a decrease of 415,075 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio Railroad and local points—Week, 50,000 tons; year, 929,272 tons; decrease, 239,869 tons. To Pennsylvania Railroad—Week, 5981 tons; year, 158,834 tons; decrease, 86,253 tons. To Chesapeake and Ohio Canal—Week, 11,869 tons; year, 93,880 tons; decrease, 88,951 tons.

Taking and Giving Advice.

Taking good advice is quite a different thing from giving good advice. Almost everybody knows how to do the second; next to nobody knows how to do the first. Yet taking good advice is, normally, at least quite as important as giving good advice; and in the present state of the world, it is much more important. What a sudden change there would be in this blundering old world, if the taking of good advice were as easy and as pleasant as its giving.

It was a favorite thought and conceit of the classical writers that men were divided into three classes: Men who, themselves, knew what they ought to do; men who did not, themselves, know, but who were willing to learn from others what they should do; and men who neither knew nor would learn from others, what was best for them to do. If one cannot belong to the choice few who form the first of these three classes, he ought at least to see that he does not belong to the ignoble many who form the third,

PRACTICAL AND THEORETICAL MINING.

QUESTIONS AND ANSWERS PREPARED WITH A VIEW TO ASSIST APPLICANTS IN

Obtaining Certificates of Competency for the Positions of Fire Boss, Mine Boss, Mine Inspector, Etc., Etc., Etc.

BY ROBERT MAUCHLINE, EX-INSPECTOR OF MINES

Entered according to Act of Congress in the year 1885, by J. S. Kirkwood & Co., in the office of the Librarian of Congress, at Washington, D. C.

VENTILATION.

Ques. 21—Give dimensions and description of a furnace, shaft and stack required to circulate a lawful amount of air in a mine having 2,000 yards of airways of thirty-six feet square area, working 100 miners together with the usual amount of drivers and mules, and what would be the kind and size of a fan to produce the same amount of air current in such a mine?

Ans.—Allowing 100 cubic feet per minute for each person employed. Therefore, in this case $100 \times 100 = 10,000$ feet would be the lawful quantity for the miners; this force should produce 400 tons of coal, and would require 8 mules and 4 drivers, assuming a mule equal to 6 men, $6 \times 8 = 48$ and 4 drivers = 52 or in round numbers the whole force would be equal to 150 men and require $150 \times 100 = 15,000$ cubic feet as the volume demanded under the law. The airway of 36 feet would give a velocity of current equal to

$$\frac{15,000}{36} = 416.6$$

lineal feet per minute. Assuming the airway to be square it would be 6×6 , and its perimeter would be $4 \times 6 = 24$ feet and 2,000 yards equal 6,000 feet in length, therefore, its rubbing surface would be

$$24 \times 6,000 = 144,000$$

square feet; assuming the usual co-efficient of friction this would require a pressure of

$$\frac{.0000000217 \times 144,000 \times 416.6^2}{36} = 15.0646$$

pounds per square foot, which would be a water-gauge of

$$\frac{15.0646}{5.2} = 2.897 \text{ inches.}$$

This is on the assumption that the whole volume travels the full length, which in practice it does not; nor is it desirable that it should. We may safely assume that this theoretical water gauge of nearly three inches will in practice be reduced by leakage of the air through brattice, &c., to say 1.5 inches, which is about the average pressure produced by fans at mines, this would be

$$1.5 \times 5.2 = 7.8 \text{ lbs. per square foot.}$$

Two furnaces 6 feet wide and 4 feet high would have an area of $4 \times 6 = 24 \times 2 = 48$ feet, and

$$\frac{15,000}{48} = 312.$$

Therefore, the air in passing over such furnaces would have a velocity of about 300 feet, and a higher speed would be inconvenient. If gas was to be handled, then a dumb drift would be necessary, which would lower the speed through the furnace according as it was regulated. Supposing the temperature was 50° on the surface, and the furnace raised it to 200° , by the time it reached the top it might be cooled to 100° . This would be an average in the upcast of 150° . Air at 50° weighs per foot,

$$\frac{1.32529 \times 30}{459 + 50^\circ} = .0781113,$$

and air 150° weighs per foot,

$$\frac{1.32529 \times 30}{459 + 150^\circ} = .0652852$$

and $.0781113 - .0652852 = .0128261$ lbs. as the difference of weight per cubic foot between the air in the down and upcast shafts. The pressure required being 7.8 pounds, it would take as many feet, depth of shaft as $.0128261$ is contained in 7.8 pounds.

$$\frac{7.8}{.0128261} = 608 \text{ feet.}$$

Therefore 2 furnaces 6 feet wide and 4 feet high at the bottom of a shaft 600 feet deep and 6×6 would produce the required ventilation under ordinary conditions. The application of a stack at the top of the shaft would add so little to the current that it would scarcely be felt, although a stack is useful to prevent the wind from baffling the current on top of the shaft. A Gubfal fan 10 feet in diameter 4 feet wide would produce 15,000 feet, with 14 inch of water gauge. The power required to move this quantity of air would be

$$\frac{15,000 \times 7.8}{33,000} = 3.54 \text{ H. P.}$$

Allowing the fan to give out 30 per cent. of its power on the air, and allowing power to increase

the speed for emergencies, the fan should be driven by an engine capable of developing at least 15 horsepower.

Ques. 22.—The air course in a mine is 7×8 and 960 feet long, passing 63,480 cubic feet of air per minute; this air course is then divided into four separate splits, as follows:

First split	6	5	and	1,200	feet	long.
Second "	6	6	"	900	"	"
Third "	6	4	"	840	"	"
Fourth "	5	4	"	720	"	"

With the same total volume, what quantity will pass in each split, and what will be the water-gauge, using Atkinson's co-efficient?

Ans.—Adopting the formula

$$V^2 = \frac{Pa}{Ks}$$

If we denote P the pressure by 1 the formula becomes

$$V^2 = \frac{1}{Ks}$$

the unit 1 being the assumed pressure for each split and .0217 the co-efficient for a velocity of 1000 feet per minute, then the relative velocities in thousands of feet per minute are found by the formula as follows:

$$(1) V^2 = \frac{30}{.0217 \times 22 \times 1,200} = .052366, \sqrt{.052366} = .228$$

$$(2) V^2 = \frac{36}{.0217 \times 24 \times 900} = .076804, \sqrt{.076804} = .276$$

$$(3) V^2 = \frac{24}{.0217 \times 20 \times 840} = .065832, \sqrt{.065832} = .256$$

$$(4) V^2 = \frac{20}{.0217 \times 18 \times 720} = .071115, \sqrt{.071115} = .266$$

These multiplied by 1000 will reduce them to feet per minute, and the product multiplied into the areas will give the relative quantities for each split.

(1)	$228 \times 1,000 = 228$	$228 \times 30 = 6,840$
(2)	$276 \times 1,000 = 276$	$276 \times 36 = 9,936$
(3)	$256 \times 1,000 = 256$	$256 \times 24 = 6,144$
(4)	$266 \times 1,000 = 266$	$266 \times 20 = 5,320$

The total relative quantity 28,240 cu. ft.

Then by proportion as the total relative quantity is to relative quantity in each split, so is the total actual quantity to the actual quantity that will pass in each of the splits.

(1)	28,240	: 6,840 ::	63,480	: 15,375.46
(2)	28,240	: 9,936 ::	63,480	: 22,334.88
(3)	28,240	: 6,144 ::	63,480	: 13,810.94
(4)	28,240	: 5,320 ::	63,480	: 11,958.69

63,479.97
3

Total quantity being within $\frac{1}{100}$ of a } 63,480.00
cu. ft. of the total given quantity.

The pressure for each airway is found by

$$P = \frac{Ks v^2}{9}$$

$$(1) p = \frac{.0217 \times 22 \times 1,200 \times .26262}{30} = 5.015$$

$$\frac{5.015}{5.2} = .983 \text{ inch water-gauge.}$$

$$(2) p = \frac{.0217 \times 24 \times 900 \times .3489}{36} = 5.012$$

$$\frac{5.015}{5.2} = .983 \text{ inch water-gauge.}$$

$$(3) p = \frac{.0217 \times 20 \times 840 \times .33108}{24} = 5.029$$

$$\frac{5.015}{5.2} = .983 \text{ inch water-gauge.}$$

$$(4) p = \frac{.0217 \times 18 \times 720 \times .35748}{20} = 5.026$$

$$\frac{5.015}{5.2} = .983 \text{ inch water-gauge.}$$

The slight difference in the pressure is due to the fractions not being carried out to over six places of decimals in extracting the roots.

(To be Continued.)

A regulation as old as the French Academy of Sciences has just been broken through in Paris. Women have hitherto been excluded from the sittings of the Academy, but at the meeting of June 28 the interdiction was raised in favor of Mlle. Sophie Kowlewska, professor of mathematics at the University of Stockholm, and daughter of the eminent paleontologist. Admiral Jurien de la Graviere, who presided, welcomed her in graceful terms, and said that her presence should be a cause of pride and pleasure, not only to the mathematicians present, but to the whole Academy. As she entered, the whole of the members rose to salute her. She took her place between Gen. Fave and M. Chevreul.

Beltting Experiments.

At the recent meeting of the American Society of Mechanical Engineers in Chicago, a paper was read by Mr. Wilfred Lewis, of Philadelphia, on the "Experiments on the Transmission of Power by Beltting." Among the conclusions reached from these experiments are the following: That the coefficient of friction may vary under practical working conditions from 25 per cent. to 100 per cent.; that its value depends upon the nature and condition of the leather, the velocity of sliding, temperature and pressure; that an excessive amount of slip has a tendency to become greater and greater, until the belt finally leaves the pulley; that a belt will seldom remain upon a pulley when the slip exceeds 20 per cent.; that excessive slipping dries out the leather, and leads toward the condition of minimum adhesion; that rawhide has a greater adhesion than tanned leather, giving a coefficient of 100 per cent. at the moderate slip of 5 feet per minute; that a velocity of sliding equal to 0.01 of the belt speed is not excessive; that the coefficients in general use are rather below the average results obtained; that the sum of the tensions is not constant, but increases with the load to the maximum extent of about 33 per cent. with vertical belts and indefinitely with horizontal belts; that as the economy of belt transmission depends principally upon journal friction and slip, it is important to make the belt speed as high as possible within the limits of 5,000 feet or 6,000 feet per minute; that quarter twist belts should be avoided; that it is preferable in all cases, from considerations of economy in wear on belt and power consumed, to use an intermediate guide pulley, so placed that the belt may run in either direction, and that the introduction of guide and carrying pulleys adds to the internal resistances an amount proportional to the friction of their journals.

Hastening of Leather Tanning.

In a process patented in Germany on Dec. 8, 1885 (Ger. pat. 36,015), J. S. Billwiller, of St. Gallen, Switzerland, proposes that the softened unhaird, and purified skins be alternately treated with dilute solutions of sulphate of alumina and bicarbonate of soda. This operation must be frequently repeated. If, however, a solution of sulphate of alumina, as neutral as possible, be employed, more concentrated solutions can be employed, and it suffices then to adopt a single treatment with each solution. The hides thus swollen, and filled with aluminum hydrate, are then freed by a quick wash with dilute hydrochloric acid, and then with water, from the aluminum hydrate separated out on the surface. They are then tanned out in the tan solutions. Seeing that the hydrate of alumina combines with a portion of the tannin to form aluminum tannate, the tanning process is very greatly expedited.

Mr. A. Sanson, in an article in a recent number of the *Revue Scientifique*, states that, from a comparison of animal and steam power, in France at least, the former is the cheaper motor. In the conversion of chemical to mechanical energy, 90 per cent. is lost in the machine, against 65 in the animal. He finds that the steam horse power, contrary to what is generally believed, is often materially exceeded by the horse. The cost of attraction on the Montparnasse-Bastille line of railway he found to be for each car, daily, 57 francs, while the same work done by the horse cost only 47 francs; and he believes that, for moderate powers, the conversion of chemical into mechanical energy is more economically effected through animals than through steam engines.

Mr. W. F. Denning has made a series of careful drawings of the appearance of the planet Mars this year, and finds the edges of the seas very brilliant and well defined. The surface markings of the planet are very varied, and in some places distinctly mottled; and during the past few months the north polar cap has been very bright, and in startling contrast to the less luminous regions. Mr. Denning thinks that the atmosphere of Mars, instead of being dense and cloud laden, is extremely attenuated; and that most of the supposed changes in the latter are really due to changes in the earth's atmosphere.

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FOR THE WEEK ENDING

SATURDAY, AUGUST 21, 1886.

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BUSINESS PROSPECTS.

During the past week, as during the past month, there has been but a single unfavorable sign in the condition of general business. The volume of business being transacted is larger and better than usual, and is increasing and improving; exchanges show an average increase of nearly 20 per cent.; the grain movement is, perhaps, the largest ever known, and railroad earnings show a very satisfactory increase. Both imports and exports have increased perceptibly, and speculation is more active than at any time during the past several years.

The bank statements of the past few weeks, which show a loss in legal tenders of about \$5,000,000, indicate a positive expansion in trade, but they also foreshadow the only real danger in the present situation—a possible stringency in the money market. This fact is generally recognized, and in some quarters is seriously apprehended, but the causes operating to produce the effect are not agreed upon. Such newspapers as uniformly defend the cause of the money-lenders attribute the growing scarcity of money to the continued coinage of silver dollars. This is a sort of paradoxical argument, but has the merit of being about as logical as the average utterance of these oracles on the question.

A scarcity of money is a phenomenon naturally to be looked for at this season of the year, when currency has to be sent westward in large quantities to assist in bringing the crops to market, but appearing as it does when the banks are drawn down nearly to the limit allowed by law, it heralds an approaching rise in the rate of interest and a consequent restriction of borrowing facilities. The truth of the whole matter is plain. The restoration of business confidence has created an extraordinary demand for money for speculation just at a time when large quantities of currency are needed to move the crops.

A year ago the reserve of the banks in specie and legal tenders was \$158,345,500; a week ago it was reduced to \$102,848,800; and the statement to be issued to-day will probably show it to be still further reduced. Where has this difference of fifty-five millions gone? The report of the United States Treasury answers the question. A year ago the total gold, silver and currency in the treasury, over and above the amounts held against outstanding certificates of deposit, was \$214,970,405; a week ago it was \$279,504,922, showing an increase of over sixty-four millions. The whole of the money lost by the banks, and more, too, has, therefore, gone into the vaults of the Treasury, and there it will remain, even though the business interests of the country shall suffer, unless the present financial policy of the administration is changed.

We have heard a great deal the past few months of the danger that if the coinage of silver dollars was not stopped gold would be hoarded, and that a terrible contraction of the currency would result. It would seem that the Treasury officials were bent on producing the contraction without waiting for any hoarding on the part of the public, and present indications are that they may possibly succeed. They are sweeping money into the Treasury at the rate of five millions of dollars a month at a time when the commercial necessities of the country require that the surplus now there locked up should be disbursed at least twice that fast. The Morrison resolution, which President Cleveland killed with a pocket veto, was well calculated to meet the requirements of the present emergency. It directed the disbursement of seventy-five millions of the Treasury surplus in payment of the bonds now due, and besides stopping the drain of \$2,500,000 of annual interest, would relieve the stringency in the money market and avoid the possibility of great commercial distress. If a panic or anything approximating thereto should result from the present unfavorable combination of circumstances and the industrial growth of the country should be arrested, the administration will be wholly responsible therefor. The means to avert such commercial distress as may possibly result from this condition of things, is not only within the reach of the government, but the people have, through their representatives in Congress, directed the Administration to use that means in furtherance of the nation's prosperity.

The failure list continues to make a favorable showing, as compared with previous years. The number reported last week was 132, against 160 in the corresponding week of last year, 237 in 1884, 174 in 1883 and 95 in 1882. The total number in the United States to date, as reported, is 6,389, against 7,367 for a like portion of last year, a decline of 978

in seven and a half months. In a like portion of 1884 the total was 6,664; in 1883, 6,178 and in 1882, 4,325.

The developments in the iron trade show an increased demand, bordering on higher prices. In fact the subject of a small advance has been under consideration by some of the Southern furnaces, but the opinion appears to prevail that it would be unwise to advance prices until more orders are looked ahead, and until the better feeling which prevails in the West has extended farther East. Orders are abundant and the output is constantly increasing.

Some improvement is reported in the Anthracite coal trade, and a slight advance in prices is being obtained, owing to the somewhat free demand and the uniform policy of keeping the production down. The limitation of the August output to 2,500,000 tons has already had a telling effect, and purchasers who have been holding off in anticipation of a break in prices, are convinced that they can buy coal cheaper now than two or three months hence. Orders from the West just now are plentier than from the East but the general demand is much improved and the prospects are that it will be still farther improved when the allotment for September has been decided upon.

GROWTH OF THE SOUTH.

The Baltimore *Manufacturers' Record* has published its semi-annual review of the industrial growth of the South. The statistics presented are very much in the nature of a surprise, inasmuch as they indicate an extent and rapidity of development in manufactures and the various industries which the country at large probably has but a faint idea of. It is evident that the South, while maintaining its agricultural progress and increasing it so that it now exceeds the record of her palmy days, has discovered that she is quite as well adapted to manufacture, and having learned this, she is making immense strides in the process of evolution into a manufacturing section. This is proven by a glance at the list of new enterprises which have been organized since the first of January of the present year. Among the noteworthy are to be found: Thirty ice factories, 40 foundries and machine shops, 1 Bessemer steel rail mill, 8 miscellaneous iron works, 17 electric light companies, 7 agricultural implement factories, 70 mining and quarrying enterprises, 11 carriage and wagon factories, 8 cotton mills, 18 furniture factories, 15 water works, 29 tobacco factories, 48 flour mills, 248 lumber mills, 3 stove foundries and 15 gas works. This is a remarkable showing, and the magnitude of it becomes still more apparent and comprehensible when the amount of money invested or pledged is taken into consideration. The actual capital and capital stock represented by the list of new enterprises, the enlargement of old plants and the rebuilding of mills after being burned—which is practically the same as a new investment—for the first six months of 1886 reached the sum of \$63,618,200, which was \$27,000,000 more than the amount invested during the same period in 1885. This total was distributed among the various Southern States, as follows: Alabama, \$4,858,500; Arkansas, \$11,425,000; Florida, \$981,000; Georgia, \$1,399,000; Kentucky, \$17,220,000; Louisiana, \$1,202,000; Maryland, \$5,139,000; Mississippi, \$457,000; North Carolina, \$1,485,200; South Carolina, \$538,000; Tennessee, \$5,297,000; Texas, \$2,986,000; Virginia, \$5,553,000; West Virginia, \$5,123,800. No stronger proof could be furnished of the fact that the South has fully aroused from the lethargy which for years before the war, and even since, had fallen upon her as the natural result of dependence upon slave labor. It is proving that this dependence was injurious to its best interests, and that self-reliance was all that was necessary to increase its prosperity to an extent which a few years ago was not deemed as among the possibilities. The new South is a much more valuable part of the nation than the old South was, and the North and West and East rejoice that it is so, and welcome its new and great prosperity as in the highest degree beneficial to the country.

SAVANNAH, Georgia, has a policeman who patrols his beat at night while asleep. This is an improvement on the policemen who sleep and don't patrol their beats at all; but what is most needed under city governments is policemen who will patrol their beats at night while awake.

Adolf Laloz, carriage manufacturer, 119 Carroll street, Buffalo, N. Y., states: "I was troubled with nausea of the stomach, sick headache and general debility. Burdock Blood Bitters cured me."

EVERY active and intelligent boy should make an effort to become interested in mechanics, and practice the use of tools. Whenever he sees a machine of any kind in operation, he should carefully inspect it with a view to learning something of its principles and mechanism, and finding out "how it works." A mechanical taste, which although sometimes born in the boy is yet frequently acquired, will in after-life be a never-failing source of enjoyment, even though it be not put to any practical use. There are many useful inventions that are the outcome of boy genius, and the records of the Patent Office show that quite a number of patents have been issued to minors through their guardians. So useful and important an invention as the steam-engine valve is said to have been made by a boy. The story runs, according to the *Scientific America*, that Newcomen's engine was in a very incomplete condition, from the fact that there was no way to open and close the valve except by means of levers operated by hand. He set up a large engine at one of the mines, and a boy (Humphrey Potter) was hired to work these levers. Although this is not hard work, yet it required his constant attention. As he was working the levers he saw that parts of the engine moved in the right direction and at the same time he had to open and close the valves. He procured a strong cord and made one end fast to the proper part of the engine and the other end to the valve lever, and the boy had the satisfaction of seeing the engine move with perfect regularity of motion. A short time after the foreman came around and saw the boy playing marbles at the door. Looking at the engine he saw the ingenuity of the boy and also the advantage of his invention. The idea suggested by the boy's inventive genius was put in a practical form and made the steam engine an automatically working machine.

The Master Mechanic.

The man who would attain to the position of a master mechanic in any line of mechanical business must acquire something more than mere technical skill, or that knowledge which pertains to the useful or mechanical arts. He should ever cultivate the consciousness that there is always something to be learned in this business, and also very much to be learned outside of it. He should be ever ready to appreciate valuable knowledge from whatever source it can be obtained; carefully study and consider every new development pertaining to his business; and, most important of all, swear unflinching allegiance to duty, to honesty, to purpose, and faithfulness to principles in the discharge of the important trust devolved upon him. He is most successful for himself who serves his employers best and first. A good foreman or master mechanic is not made of parchment, neither is he the work of a day. His growth in progress is slow, often, perhaps, discouraging, always more or less laborious. He must ever be learning, ever on the alert for some unknown or unforeseen danger, and always awake to those that are known. There is hardly a trade, industry, art or invention, with which he should not be more or less familiar, at least so far as to be able to estimate correctly the inherent elements of danger, and its relation, if any at all, to his daily work. The changes made in manufacture are to be noted, and the new dangers involved, if any, studied, counteracted or avoided. A thousand inventions, more or less pregnant with danger, are to be understood, and their hazards or advantages pointed out. In manufacture, in very few cases does new peril in the efforts made to cheapen cost of production. He should keep himself posted on the various industries of the country; study the financial situation, and watch closely the periods of prosperity and depression, and always bear in mind that there are always dangers to face which the most careful study and the greatest skill cannot fathom, and against which, oftentimes, caution and prudence are powerless, or at least can give but partial protection. In art he should be able to judge correctly of every detail of the workshop, as well as to truly estimate the priceless production of skill and genius. The best foreman and master mechanic are those who have elevated their workshops to-day are those who have elevated themselves to their trustworthy positions by hard work, close application to study, and who feel themselves fully prepared to assume any responsibilities as they may increase and be placed upon them.—*The Wagon-maker.*

It has long been necessary to meet a part of the demand for ivory for artistic and industrial purposes by an artificial substitute, which has in most cases been obtained by injecting whitewood with chloride of lime under strong pressure. A new method has been displayed at the Amsterdam Exhibition, in which the bones of sheep and waste pieces of deer and kid skins are used. The bones are for this purpose macerated and bleached for two weeks in chloride of lime, then heated by steam along with the skin, so as to form a fluid mass, to which are added a few hundredths of alum; the mass is then filtered, dried in the air, and allowed to harden in a bath of alum, the result being white, tough plates, which are more easily worked than natural ivory.

WHERE GAS CANNOT BE FOUND.

According to Prof. Lesley There is Good Hope for Fayette County.

Prof. J. P. Lesley, in a recent report of the Pennsylvania geological survey, has the following: Shall I bore for gas at my works? is a question so often asked and so seldom answered with intelligence, that a short statement of the principles involved in a correct answer to it will probably be of use to more than one reader of this report.

First of all, there can be no gas stored up in the oldest rocks.. This at once settles the question in the negative for the whole southeastern third of the state. To bore for gas in Bucks, Montgomery, Philadelphia, Delaware, Chester, Lancaster, York, or Adams county would be simply absurd.

Secondly, there can be no gas left underground where the old rocks have been turned upon edge and overturned, fractured and re-cemented, faulted and disturbed in a thousand ways. If there ever was any, it has long since found innumerable ways of escape to the atmosphere. This settles the question in the negative for all the counties of the great valley: Northampton, Lehigh, Berks, Lebanon, Dauphin, Cumberland, and Franklin, as any one can see by looking at the present condition of their limestone, slate and sandstone formations.

Thirdly, there is not the least chance that any gas is left underground in the greatly folded, faulted, crushed, and hardened formations of the middle belt of the state: Carbon, Schuylkill, Lehigh, Luzerne, Columbia, Berks, Northampton, Union, Snyder, Lycoming, Perry, Juniata, Mifflin, Centre, Clinton, Huntingdon, Blair, Bedford, and Fulton counties. Where the oil and gas rocks rise to the surface in these counties, as they do in a thousand places, they show that all their oil and gas has escaped long ago.

Fourthly, where the rock formations lie pretty flat and have remained nearly undisturbed over extensive areas—as in Wayne and Susquehanna, parts of Pike and Lackawanna, Wyoming, Bradford, Tioga, Potter, and all the counties west of the Allegheny mountain—there is always a chance of finding gas (if not oil) at some depth beneath the surface determined by the particular formation which appears at the surface; but as yet we have no satisfactory evidence of the existence of quantities of rock gas in any of these counties east of Potter.

Fifthly, wherever the bituminous coal beds have been changed into anthracite or semi-bituminous coal, it is reasonable to suppose that the same agency which produced the change, whatever it was, must have acted upon the whole column of formations, including any possible gas-rock at any depth.

Sixthly, wherever rock oil has been found, there and in the surrounding region rock-gas is sure to exist.

Mining Safety Cages.

H. W. Bracken writes to the *Virginia Enterprise* as follows: Having read in last week's *Enterprise* some of the practical views expressed by gentlemen from Silver City and Bodie, relative to the most practical and effective style of safety devices for cages in mining shafts, for the prevention of the many sad and fatal accidents such as have occurred in times past, through the breaking or non-breaking of the cable, I would like to make a few pertinent remarks as a mechanic and miner. I have considered carefully their views on the subject and approve of them to the extent of their merits. I take occasion, however, to state that I also have a device of my own invention, the result of a careful study of every phase and result of the proposition, which I confidently submit to the practical mining mechanics, engineers and superintendents of the Constock or anywhere else. It is simply a safety clutch, which is absolutely obliged to work automatically in case of cable breakage, unclutching of the reel or any other of the fatal circumstances or conditions heretofore encountered in that line, and to prove my knowledge, earnestness and perfect confidence in the matter, wherein so many human lives have been and still are at stake, I will unfeignedly offer the following test: Place a single or double deck cage on the chairs at the surface or top of the shaft, unclutch the reel to spin around its axis freely and as lively as possible, slack down all the cable you please between the reel and the sheave, or between the sheave and the cage, or take off the cable altogether, or keep on the cable at any sort of degree of tension, and, regardless of the present style of very eccentric safeties, with my own invention as a safeguard, I will step upon the cage, with my hands in my pockets, and allow the chairs to be pulled back, betting anybody \$1000 that the cage will not drop 12 inches. This may seem like a foolhardy proposition, but I know what I am talking about, and any true mechanic or practical mining engineer who examines critically my device must simply understand and see that I am right, and that the same demonstrative experiment may be performed with perfect safety at any point in the shaft as well as at the surface. Bear in mind that all the fatal mishaps referred to have occurred through the failure of the safeties to work with a tension on the kingbolt. My device is totally regardless of either tension or kingbolt, and any interested parties, who may feel skeptical in the matter, are freely and confidently invited to inspect my invention and accept my offered test.

IN NORTH CAROLINA.

What is Being Done in Developing Its Varied Mining Resources—A Good Outlook.

Have we any mines and mining operations in Western N. C?

Well, yes. There are minerals of different kinds in every county in this section, and we might say in the State, for that, but for the want of capital, to test and develop, the mining operations are not so numerous as they should be and would be, if they were different. But a great many mines are now being worked, and successfully too at that. In Mitchell county there are dozens of mica mines in successful operation—many hundred thousand dollars being expended there annually in this one mineral alone, and it is said that that county furnishes fully half the mica that supplies the world. Yancey county is but little behind in this industry, while Macon, Jackson and Swain counties are mining this mineral to a greater or lesser extent.

Then Corundum is being mined in Yancey, Buncombe, Madison, Haywood, Jackson, Macon and Clay, if we are not mistaken. The finest corundum, and in the greatest quantity in the world, is gotten here in these mines. More capital is needed for developing and operating this, now, one of the most eagerly sought after minerals in the whole list.

As fine magnetic iron as the world ever saw is found in almost inexhaustible quantities in different counties of Western N. C., similar to that at Cranberry, which induced its owners to build a railroad from Tennessee in order that it might be got out.

Gold mines are being worked in McDowell county and are said to be paying handsomely. The Holston Mining company is now at work, preparatory to commencing operation on a large scale at their mines in Henderson county. The machinery has already been bought and will be in operation in the next thirty or forty days. This is a most promising property indeed, and it is hoped will yield a paying dividend as soon as properly under headway. The owners are gentlemen of large means and will spare no pains or expense to develop and operate their mine after the most approved methods. *

Cheapened Production.

A want that is experienced in the coal trade, during these times of increased competition and decreased prices, is a handier method of having the coals conveyed from the face to the wagon ways. This is a necessity principally felt in the oldest collieries, and in pits where the production has been on an extensive scale. As the workings are enlarged and coal heaving has to be carried on a long way "in-by" the strain upon horse-flesh becomes necessarily severe, the five years' existence of animal and plant, reckoned to be the full average last in collieries, is reduced considerably, and just as the workings extend inward the cost of production is increased. What is required is some well-regulated system of haulage to bring the coal direct from the hewer to the foot of the shaft, and to those who are ingenious enough to devise such a system a season of profit may be anticipated. Cheapened haulage, indeed, and haulage that will entirely dispense with the use of horseflesh down the pit, is a desideratum that the majority of owners will be ready to welcome and adopt. This is a circumstance that inventors and manufacturers would in their own interest do well to note.

M. Alexandre de Rothe, an engineer who has been working at Panama, under M. de Lesseps, has presented to the Governments of Denmark and Sweden a project for a submarine railway tunnel under the Sound between Copenhagen and Malmo. The tunnel is to have a total length of twelve kilometers—three between Amager and the small island Saltholmen, under the Strait Drogden, and nine between Saltholmen and Sweden. The ground to be worked much resembles that in the Channel between England and France, and is said to offer no difficulty to the execution of the work. The cost of the construction is calculated to amount to 30,000,000 francs, or £1,200,000. The Swedish Government takes a great interest in the plan, while the Danish at present is keeping somewhat back. Mr. de Rothe entertains sanguine hopes of a successful result of the negotiations. The tunnel would be of the greatest importance for the future commercial connection between Sweden-Norway, and later on of Russia and the whole continent, as laden railway wagons could then run from the north of Norway, Sweden or Finland down to the south of Italy.

Carbon resulting from the imperfect combustion of natural gas, says the *American Manufacturer*, has been heretofore used to a considerable extent for lampblack and ivory black, printers' ink and paints. It is now proposed to use it to make carbons for electric lights. The earth salts in those made from woody fibre interfere with the steadiness of the light, and diminish the life of the carbon. A perfectly pure article can be procured from natural gas, and a company has been formed to engage in the business. The durability of these carbons is as thirteen to eight, and the light produced is of increased brilliancy.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should be written in a clear and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith. The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

Water.

Editor Mining Herald and Colliery Engineer:

SIR:—I have recently assisted in measuring a stream of water flowing through a mine by floating a straw in it for a given distance. The result not being satisfactory to me, may I ask to have answered two questions bearing upon it in your "answers to correspondents." The questions are—(1.) Dimensions of level containing stream of water as taken at six different points: Width stream in level 11 in. + 11 in. + 11 in. + 11 in. + 10 in. + 11 in. = 65 ÷ 6 = 10.83 in. Depth of stream in level at the same six points as under: Depth 2 in. + 2½ in. + 2½ in. + 4 in. + 3 in. + 4 in. = 18 ÷ 6 = 3 in.; distance 30 ft.; time taken by straw to travel, nine seconds. Answer required in gallons per minute. Ques. No. 2, width of stream in level, 11 in. + 11 in. + 12 in. + 12 in. + 12 in. = 58 ÷ 5 = 11.6 in. Depth of stream in level at each of the above five points: Depth 7½ in. + 8 in. + 8 in. + 7 in. + 6½ in. = 38 ÷ 5 = 7.6; distance 30 ft.; time taken by straw to travel twenty seconds. Answer required in gallons per minute flowing, with short explanation process by means of which you arrive at a correct answer.

Yours, &c.,

C. N. R.

Shamokin, Pa., August 2, 1885.

Survey.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any of your able correspondents state or describe the simplest and most common method of keeping a survey book. Where should I procure a good book on the subject, and at what price? What is the use of the vernier and how is it used?

Yours, &c.,

MINING STUDENT.

Mahanoy City, Pa., Aug. 3, 1886.

Airway.

Editor Mining Herald and Colliery Engineer.

SIR:—Would any of your able correspondents try and work out the following questions? (1.) Assuming an airway 25 feet area, and 300 yards long, passes 2,150 cubic feet of air per minute, what should be the area of another airway 400 yards long to pass the same quantity, all other things being the same? (2.) An airway 600 yards long and 36 feet in area passes 3,000 cubic feet of air per minute, what quantity will pass through an airway 700 yards long and 40 ft. area?

Yours, &c.,

H.

Drifton, Pa., Aug. 2, 1886.

Two Pressure Queries.

Editor Mining Herald and Colliery Engineer:

SIR:—The piston of an engine has sixty pounds pressure at the beginning of the stroke; the steam is cut off at half stroke. What is the average or effective pressure on the piston, and what pressure would be taken to figure up the horse-power of the engine?

Yours, &c.,

J. E.

Shenandoah, Pa., Aug. 16.

Copies of the New Mine Law.

We had printed a large number of both the new Anthracite and Bituminous mine laws of this State for sale at this office, but we found the demand for them so large that both have already been completely exhausted. We therefore printed another and larger edition of each of the laws mentioned for those who desire them. They have been carefully read and compared with certified copies from the Governor. The price per copy of either the Anthracite or Bituminous law is only 10 cents. Not a single miner in the State can afford to be without the law affecting the region in which he resides.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that always, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

THE COLLIERS' LIVING.

Some Interesting Facts, Figures and Statements on British, German and French Expenses.

English writers and public speakers never tire of comparing the material condition of the British workman with his Continental neighbor for the purpose of drawing a conclusion favorable to the former. The Continental workman is described as a mean-spirited wretch, leading a sorry existence. He is said to toil through a long day for a rate of payment scarcely sufficient to hold soul and body together. And all this is proved by official statistics of the rate of wages in each country. The end which these speakers and writers have in view is usually to show that the competition from which we suffer is but a transient condition of things; that the Continental workman will soon cease to labor for the insufficient remuneration he now receives: that for this is necessary to the argument—the British workman will henceforth rest contented with his lot; and that consequently we shall soon regain all that we have lost. I fancy there is more than one weak link in this chain of reasoning. But my business now is only with the alleged great inferiority of our rivals' material condition.

I have on several former occasions endeavored to show that this view of our relative situation would not bear examination—that mere statistics of the relative rate of wages prove nothing. The amount of money a man possesses does not constitute his wealth. The question is a much less simple one than that. Something depends upon what that amount of money will buy—and something more on the possessor's needs, or fancied needs. A trite enough remark, no doubt; but the truth is constantly suppressed, if not forgotten. My readers will remember that I have described the French collier as the best paid workman in France when all his "extras" are taken in account. Now, let them hear what a well-informed Frenchman, M. Paul Lafitte, has to say concerning the "living" of the average workman—not a miner, be it remembered, and therefore not the best paid class. The writer of the *Revue Bleue* gives the daily "bill of fare" of the French workman, and compares it with that of the German. Here it is for the former, with the cost of the quantities consumed:—

For breakfast.....	Bread and butter, with brandy.....	Fr. 0-25
For dinner.....	Bread.....	0-15
	Soup and beef.....	0-20
	Other meat or vegetables.....	0-20
	Dessert.....	0-10
	A litre (nearly a quart) of wine.....	0-30
	Coffee.....	0-30
For lunch.....	Bread and wine.....	0-25
For supper.....	Various.....	0-80
		3-20

Now, I call this living like a lord, a fighting-cock, or whatever other simile most accurately expresses the truth. The miner, be it remembered, has some money—and a good bit of money, too—left after he has regaled himself in this lordly fashion. He has also a neat and comfortably built cottage at half rent. His children are educated free of cost. He has medical attendance gratis, and he has a sick fund to fall back upon in case of need. Moreover, his children are set to work at an early age. And if he has no children, his wife takes her part in the surface work. If I were drawing up a bill of fare myself instead of accepting that of Paul Lafitte, I should add Theatre or other amusements, 0-50 fr., as the necessary mental food of the French workman. But taking the statement as it stands, I fail to see where the sorry existence comes in, and in what respect the material condition of the Continental workman is so vastly inferior to that of the Britisher.

But, it will probably be objected, it is the Germans and the Belgians, and not the French who are running us so hard in the race of competition. It must be admitted that these, our rivals in trade, do not earn so much money as the French, and, as a consequence which may be accepted as necessary, do not spend so much. But since they are content to live less luxuriously, I think there is not much to be made out of that fact. Let us now look at the German daily bill of fare. Before going to work, bread and coffee; at nine o'clock, a breakfast, consisting of bread, butter, ham and brandy; at noon, a dinner, composed of meat and vegetables; at four o'clock a light repast; in the evening, a supper, consisting chiefly of potatoes, with beer. Total cost of these five meals, 1-50 fr. This expenditure is less than half that of the Frenchman. But mark, the German has got a good deal for his fifteen pence. His food is abundant and wholesome, and if he has not been able to get a quart of wine for his dinner, he gets five meals a day, and finishes up with beer. His temperament and habits of life lead him to live in this way—not his inability to earn more wages. As the expenditure here set down is not more than half the average man's earnings, and as the German miner, like the French, has "extras," his lot does not appear to be a particularly hard one. His hours of labor are long, it is true; but having less repu-

nance to heavy toil than the Frenchman, he chafes under it less. He is, in fact, the most contented workman in Europe at the present time. Socialist doctrines have, it is true, spread in Germany, and these are naturally bearing fruit in a growing disposition to revolt against the existing order of things. But the progress of Socialism has been less rapid in Germany than in the neighboring countries.

The moral of all this is that we deceive ourselves, and the wish being father to the thought, draw a conclusion which fits in with our desire, but is greatly at variance with truth. It is sheer nonsense to endeavor to persuade ourselves that competition is about to become less keen for a reason such as this. Something of the kind may occur in Belgium. But even there the change is not going to be of a general and sweeping character, as some have predicted. Probably the working day will be shortened by one hour ere long. But in this the talked-of "reformation" will end. As for the Germans and the French, the best answer to the question is to be found in the bills of fare which I have transcribed.—Geo. G. Andre, F. G. S., M. E. &c.

Chicago.

From the Industrial World.

Jobbers still complain of a rather dull trade, and say the recent advance in Anthracite has had the effect of checking sales quite materially, although the inquiry is picking up somewhat. Considerable coal is moving into the country, in fact the total shipments are equal to about one-third of the actual receipts. Contrary to the general belief, the receipts for hard coals, both for the first half of the current year and for the month of July, show an increase over those of the same periods of last year, as the following figures from the report of the Bureau of Coal Statistics will show: Total receipts from January 1 to July 31, 1886, 907,122 tons; for 1885, 897,510 tons; and from July 1 to July 31, 1886, 178,379 tons; for the same time in 1885, 132,660 tons, showing a gain of 45,719 tons. The stock on hand, however, is many thousands of tons short of last year, and is likely to remain so on account of indisposition on the part of vessel-owners to carry coal. The reason assigned is that they are making more money by handling Lake Superior iron ore. There has been no change in prices during the week. Lake freights from Buffalo are fairly active, all tonnage offered being readily placed at 60 cents for Chicago and Milwaukee.

In Anthracite the market has shown a little brighter feeling during the week owing to the fact that several large contracts for the year's supply have come in. Satisfactory orders can be placed at 20c/25 cents lower than the card rates quoted.

The trade in Bituminous coals continues rather slow, although the business doing since August 1 has been considerably better than last month. Prices are more or less shaded.

The trade in canal coal is light, and no important sales are reported.

Coke is in fair request, and values remain steady at about card rates.

There is a fair demand for charcoal, and shipments are ample.

We quote as follows:

ANTHRACITE.	
Per gross ton by carload, 2240 lbs.	
Grate.....	\$ 70
Egg.....	70
Stove.....	60
Nut.....	60
Lehigh Lump.....	70
Per net ton by carload.	
Grate.....	\$5 13
Egg.....	5 13
Stove.....	5 08
Nut.....	5 08
BITUMINOUS.	
Eric & Briarhill.....	\$4 15
Pittsburg.....	3 20
Indiana Block.....	2 40 @ 25
Slack.....	1 25 @ 135
Nut.....	1 65 @ 150
Baltimore.....	1 75 @ 150
Hocking Valley.....	2 75 @ 290
Youghiogheny.....	3 20 @ 330
Wilmington.....	2 10
Blossburg.....	3 25
Cumberland Smithing.....	3 25
Sonman Smithing.....	3 40
Grape Creek.....	2 00
Mountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Minonk.....	2 00
Morris.....	2 60

CANAL.	
Kanawha.....	4 25
Buckeye.....	4 25
COKE.	
Connellsville Coke.....	5 00
Crushed Coke.....	5 50
Charcoal, carload per bu.....	8½ @ 8½

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Aug. 14, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	60,225-16	1,263,148-0
Shipped South.....	60,026-00	1,672,468-13
Total.....	93,894-11	2,935,616-01
For corresponding time last year.		
Shipped North.....	62,780-06	1,198,578-14
Shipped South.....	60,026-00	1,396,668-14
Total.....	122,815-06	2,594,247-08
Increase.....		341,368-03
Decrease.....	28,920-15	

CURRENT COMMENT.

PASSING NOTES ON MATTERS TRANSPIRING IN THE MINERAL AND INDUSTRIAL WORLDS.

The Pittsburg, Chartiers & Youghiogheny railroad was sold last week to the Pennsylvania railroad company. The road runs from Chartiers to Montour, a distance of 18 miles, and taps a valuable tract of coal property. It was built by the Economite society at a cost of \$1,000,000. The price paid by the Pennsylvania company is not known.

The Brassstown mines, in Cherokee county N. C., have been adding machinery. They have just recently completed the setting up of a mill for reducing their ore. They have taken out some gold, and are busy in pushing all the departments of work, with a view of enlarging the amount of material handled and, consequently, enlarging the income from the mine.

Machine shop labor is better employed now than for many months. The railroad companies as a rule are doing a great deal of repairing. All the railroad machine shops are running with a full force, particularly west of the Mississippi. A goodly number of orders for locomotives have been given out recently, of which about 50 were given in Pennsylvania. New Jersey, New York and New England locomotive builders expect to secure orders during the current month. Railroad managers are more inclined to increase their rolling stock at this time than they have been for a year or two past.

The wisest step the Knights of Labor have yet taken is that looking to the expulsion of anarchists from their ranks. Anybody in this country which endorses or hesitates for a moment to condemn the principles that actuate anarchists and communists will be condemned so quickly that in the slang of the period it will want to know what dropped.

At the present time in the United States there are remaining about 200,000,000 acres of public land for the use of the coming generation of men. The Chicago Herald says that "at the rate of disposal of the last year, only eight more years of such reckless and prodigal frittering away of the nation's domain will be necessary in order to reach the end. During the last fiscal year 20,113,663 acres were swept off the list of free lands."

The workmen seem to be preparing for a political revolution. Just how to bring it about is not clear. Their friendship for the old political parties is weakening. They are growing more and more ready to co-operate with any honest effort that promises success. The state legislatures and congress have trifled with them, and they feel that no result is to be had through the old political parties.

The Brooks petroleum fuel and power company gave an exhibition last week of their invention applied to a locomotive attached to a train on the Washington & Ohio railroad. A run of 30 miles was made with most satisfactory results. One barrel of oil, costing 68 cents, was the amount of the fuel used. The company are making arrangements for the manufacture of their appliances, which can be attached to any locomotive or to stationary boilers.

There has been of late so much alarmist talk, says London Truth, about the exhaustion of our coal fields that it is good news to learn that an inventor, R. M. Marchmont, has at last perfected an engine in which the steam is returned to the boiler, and, so to say, used over and over again. The saving in coal thus to be effected is calculated at 80 per cent. Besides saving coal, however, this invention will upset a pet theory of the engineering fraternity, who have always considered this problem as impossible as perpetual motion. It is to be feared that our contemporary has gone a little in advance of his patronymic.

Dr. James P. Kimball, director of the mint, has completed his report on the production of gold and silver in the United States during the calendar year 1885. The production of gold is estimated at \$30,500,000, an increase of \$1,000,000 over the estimate for the calendar year 1884. The production of silver for the calendar year 1885, calculated at the coining rate in silver dollars is estimated at 51,500,000 against 48,800,000 in 1884; an increase

of 2,800,000. Colorado still retains foremost rank as the largest producer of precious metals, California, retaining second position. The most notable changes have been in Montana and Idaho, the production having increased from 6,000,000, in 1881, to nearly 13,500,000 in 1885, and the latter from 3,970, in 1884 to 5,300,000, in 1885. Nevada, New Mexico and Dakota still hold their own, while the production of Arizona has slightly decreased.

Labor Laconics.

The price of old rails has advanced \$2.20, and orders are being given for them at \$22.50 per ton.

The outlook in the Pittsburg brick business is reported encouraging.

The employers at W. H. Everson & Co.'s mill at Scottsdale, Pa., have struck again for the reinstatement of Engineer Nichol.

The nailers in Oakland, Cal., are having trouble with their employers.

The executive committee of the Knights of Labor at Parsons, Kan., have been released from jail, where they have been confined for the part they took in the late strike on the Missouri Pacific road.

The Cincinnati ragpickers have been on a strike for two weeks. They held a picnic to raise funds, and the treasurer has skipped with the proceeds. The strike is off.

A man named Dewers, has taken a contract from the Towanda, Pa., Coal Company to saw three million feet of lumber at their Barclay mills.

A gentleman who has been through the South and has made a special study of the labor question in that region, says that the negroes are being admitted into the Knights of Labor organization and that this fact will have a very powerful influence upon the future of the colored race; that this organization of the Knights of Labor will protect them against intimidation or outrage, and that this protection will have marked effect upon the policies of the South.

He was a carpenter. He lifted his hammer to strike a nail. Did he strike? Not much! He paused, then returned the hammer to the box. The 12 o'clock whistle had blown. He was working by the day.

The M. & L. A. A. and K. of L. demonstration at Locust Dale, Pa., Monday, was a grand affair. The collieries in the vicinity were all idle.

A new coal field near Arnot is to be explored.

A wire nail factory is being talked of at Towanda.

Erie capitalists are talking of organizing a company, with a capital of \$100,000, to manufacture petroleum gas.

A company will be formed at Chester of local capitalists for the purpose of manufacturing iron ware and machinery.

The Kittanning iron mill, at which there are twenty puddling furnaces and upward of 200 workmen, has resumed operations after a shut-down lasting over six weeks.

The manufacturing works at Carlisle have plenty of work on hand. The frog shops have orders enough on hand to keep them in operation until spring. The car shops have received an order for 200 cars.

AN AVALANCHE OF PEAT.

LOSS OF LIFE AND PROPERTY CAUSED BY A BREAK IN THE FALKLAND ISLANDS.

Secretary Bayard has received a dispatch from the United States Consul at Port Stanley, Falkland Islands, giving an account of a slip of peat which occurred on the night of June 2, causing loss of life and great destruction of property. Extending the entire length of the south shore of the harbor, and at a slight elevation, is a peat-bog from which the laboring population cut their fuel. There are no channels which drain the bog, and large quantities of water collect there during the long rains, which at certain seasons last for days at a time. For three days previous to the disaster a rainstorm had prevailed. About 8 o'clock in the evening the bog began to quake, and finally, with a noise like thunder, it broke loose, rushing down upon the

town, carrying away everything in its course, blocking up the streets and piling up the peat in places to the height of six or eight feet. Solid stone walls were rent asunder, fences, porches, iron lamp-posts torn away; turned up boats, houses—all were swept away before its march. The bewildered and terrified population believed their town was being destroyed by an earthquake and added their piercing yells and cries for help to the indescribable horrors of the night. The avalanche lasted only an hour, but its path was one of great devastation. A mass of scattered peat amounting to no less than 50,000 tons lay over the town. A boy of seven and an old man named Patrick Keating were lost. The body of the latter has not yet been exhumed. At the date of the dispatch, fourteen days after the slide, the people living near the inundated parts were fearing another disaster and were constantly on the alert. The Consul shared their apprehensions to some extent, as the winter season, when heavy snows and rains prevail, was at hand. The citizens of the port had collected £200 for the relief of the principal sufferers.

MINING MELANGE.

Copper mining is being vigorously pushed at Raker City, North Carolina.

People about Tower City, Pa., are anxious for the future of Kalnia Colliery. The old openings have been worked out and no new ones have as yet been made.

The Osceola Coal Company's miners have volunteered to work at rates below the Columbus scale.

Lima, Peru, is preparing to open a permanent mineral exhibit, to contain the mineral products of that country, and also mine working machinery.

Further discoveries of gold are being reported in the northern part of Western Australia. Several men are said to have made their way into Sydney from the supposed gold fields. They report the new field as likely to be the largest in Australia.

The closing down of the famous Copper Queen mine, in Arizona, is the result of the long-prevailing low price of copper.

The Towanda, Pa., Coal Company are putting down a test bore hole for coal in Sand Run, about half a mile from Towanda.

The Williamstown, Pa., colliery that has been idle for several months, resumed operations this week. During the temporary idleness of the mine the company has made extensive improvements that add to the safety of the works and the facilities for producing coal.

The work of opening two tunnels at the Gilberton, Pa., colliery, which was commenced a week ago, is progressing.

Remarkable Faith Cure.

An Akron (Ohio) dispatch in the New York Sun of August 16 says: Fourteen years ago Miss Lizzie Suloff, then 10 years of age, fell from a hay-loft in a barn and so injured her spine that she became paralyzed. She has been unable to sit up in bed, and entirely lost the use of her limbs. Occasionally unconsciousness overcame her and she appeared to be dead. The faith cure was broached to her, but she had no faith in its efficacy in her case. After many fruitless efforts to have her consent to a test she finally withdrew her objections, and Dr. Charles Cullis, of Boston, who takes an interest in such cases, agreed to have special prayer for the bed-ridden invalid at 3 P. M. on August 3. At the appointment Rev. Mr. Wallace and several families in their respective homes knelt and earnestly prayed for the restoration to health of the sufferer. Lizzie also prayed, but, as she says, fearing that her prayer would not be heard, as had so many times before been the case. Then, almost breathless from excitement and nervousness, she waited for the relief that human hands and human agencies had failed to give her. Her heart swelled and her breath almost left her as she felt strange sensations in her withered body. She sprang erect, and her limbs were supported her, but only for a moment. Then she fell upon her couch, and in a few hours she stood up again and her step was firm. She clasped her hands and cried aloud in thanksgiving. She is now well, happy and strong.

LIVING ON HORSE FLESH.

THREE LITTLE GIRLS FOUND IMPRISONED AND STARVING IN A HUT ON LONG ISLAND.

NEW YORK, Aug. 18.—Dr. Nadal, Health Officer of the town of Jamaica, charges Charles Stroebel, an old man who resides in a house at Blackstump, with treating his three children with excessive severity. Their mother is dead. Stroebel, it is said, has plenty of money, but is a miser and never allowed his wife or children to have the care of a physician. A gentleman noticed the children on Sunday as he was walking through the woods and on his return he notified the authorities that they appeared to be in a starving condition. Dr. Nadal visited Stroebel's residence on Monday and found three children, two girls, the eldest five years old and the youngest nineteen months, locked in the house. The physician gained admission to the house through a window which he forced open. There he found remnants of horses' legs from which most of the flesh had been eaten. The two elder children were covered with bruises. The eldest girl produced a heavy stick with which, she said, her father frequently beat them. The doctor said that the youngest child was a cripple.

The children had been imprisoned in the house from early Saturday morning until 7 in the evening. Their food consisted of horse meat, sodden bread and water. In the yard adjoining was a cow kneedep in filth. Bones of animals and the remains of pigs were strewn about the yard. The eldest girl told Dr. Nadal that her father beat her often because she could not do the housework to suit him. Stroebel was locked up for examination. Overseer Ryder has taken the children in charge.

Valuable Coal Seam.

A correspondent informs the Look Haven Express that there are a number of tracts of land located near the village of Westport, Clinton county, underlaid with excellent Bituminous coal. These lands are known as the Munson & Morrison tract of 3,000 acres; Karthaus coal and lumber company's tract 1,000; Mann & Kintzing tract 6,000 acres; Charles Noyes tract 2,500 acres; together with other adjoining large unclaimed tracts of coal. The quality of the coal in this basin cannot be surpassed for steam purposes and for use in puddling furnaces, as has been shown from tests made at the Lehigh Valley works where it has been used for smelting iron, and as the reports from the company show. The assertion that the coal could not be used for making steam have been made by parties not qualified to render a verdict. Some parties have asserted that this is the B seam at Snow Shoe. This can not be. The B seam is small seam only three feet thick at most. The C seam at Cato, only six miles from Snow Shoe, is between five and six feet thick. This, however, is a matter of small importance, as the coal at Two-Mile Run cut from five to six feet. There is in this district, in round numbers, about two hundred million tons of coal nearer to market than any other coal to-day.

Travelers arriving in New York City, tired hungry and dusty, will find the Grand Union Hotel, immediately opposite the Grand Central Depot, an excellent stopping place. It is conducted on the European plan, and for \$1.00 a day an excellent room can be had. The restaurant is fine and the prices moderate. Baggage is taken to and from the Grand Central Depot without charge.

Remarked by R. C. Joiner of Allen, P. O. Hillsdale Co., Mich.: "Nothing gave my rheumatism such quick relief as Dr. Thomas' Electric Oil.—believe it infallible for rheumatics."

M. L. Blair, Alderman 6th Ward, Scranton, Pa., stated Nov. 9, '83: He had used Dr. Thomas' Electric Oil for sprains, burns, cuts, bruises and rheumatism. Cured every time.

The three outlets of diseases are the bowels, the skin and kidneys. Regulate their action with the best purifying tonic, Burdock Blood Bitters.

Sweet Scented Flowers.

Some idea of the magnitude of the business of raising sweet scented flowers for their perfume alone may be gathered from the fact that Europe and British India alone consume about 150,000 gallons of handkerchief perfume yearly; that the English revenue from French eau de cologne of itself is \$40,000 annually, and the total revenue of England from other imported perfumes, is estimated at \$200,000 each year. There is one great perfume distillery at Cannes, France, which uses yearly about 100,000 pounds of acacia flowers, 140,000 pounds of rare flower leaves, 32,000 pounds of jasmine blossoms and 20,000 pounds of tuberose blossoms, together with an immense quantity of other material used for perfume. Victoria, in New South Wales, is a noted place for the production of perfume yielding plants, because such plants as the mignonette, sweet verberna, jasmine, rose, lavender, acacia, heliotrope, rosemary, wall flower, lanel, orange and the sweet scented geraniums are said to grow there in greater perfection than in any other part of the world. South Australia, it is believed, would also be a good place for the growing of these perfume producing plants, though they are not yet cultivated there to much extent. The value of perfumes to countries adapted to their production may be gathered from the following estimate of their growth and value per acre:

An acre of jasmine plants, 80,000 in number, will produce 5,000 pounds of flowers, valued at \$1,250; an acre of rose trees, 10,000 in number, will yield 2,000 pounds of flowers, worth \$375; 100 orange trees growing on an acre, will yield, at ten years of age, 2,000 pounds of flowers, valued at \$250; an acre of violets, producing 1,600 pounds of flowers, is worth \$800; an acre of cassia trees of about 300, will, at three years of age, yield 900 pounds of flowers, worth \$450; an acre of geranium plants will yield something over 200 pounds distilled oil worth \$2,000; an acre of lavender, over 3,500 flowers for distillation, will yield a value of \$1,500. —[Brooklyn Magazine.

Dress of the Seminoles.

There are to-day about six hundred Indians remaining in Florida. These relics of past glory and power are becoming demoralized in an alarming degree by the encroachments of modern civilization and whiskey. These potent agents have, in a great measure, ruined the Seminoles, and wild, unbridled tendency to live and die as free and as innocent of work as the alligators and herons of his native marshes. The Seminole of to-day scorns any impediment in the way of breeches, and seems to think that the use of these garments betoken little else but vanity and extravagance on the part of those who wear them. The change of the season does not affect his attire, for the only garment between him and the world—a stout, well greased shirt—serves him as well in winter as in summer. Sometimes they come striding into the town of Kissimmee as stately and en deshabille as a bronze statue of Mercury. Lately, however, the braves are presented with a pair of pantaloons immediately upon their arrival in Kissimmee. One of the chiefs, named Tom Tiger, has formed the habit of dressing in a becoming manner, and when rigged out in a pair of new pantaloons, a pair of moccasins, a bright clean calico shirt and a half dozen red handkerchiefs around his neck, crowned with an immense red turban, no one can help admiring him. His splendid figure and the careless, unconscious grace with which he carries himself, will always impress the person who meets Tom Tiger for the first time. Billy Buster, who is a little older than Tom, does not reflect much glory on his ancestry. Billy still remains as unregenerated as can be, and disdainfully refuses to accept the pair of pantaloons usually tendered him upon his arrival in Kissimmee. No one ever saw Billy Buster dressed like a white man, and it is very likely no one ever will. —[Detroit Free Press.

Dr. Albert Rosenberg, of Berlin, has found in a solution of methol a useful substitute for expensive cocaine in cases requiring local anaesthesia of the mucous membrane of the nose, pharynx, larynx, etc. It is said to be more transitory in effect than cocaine, and, on repeating the application, to give evidence of cumulative action.

A Bad Actor.

"You have a natural ability for acting, Green. What ever kept you off the stage?" —[Tid Bits.

Unappreciated Native Talent.

Fond Mother.—"I think Violet's voice ought to be cultivated abroad."
Sensible Father.—"Anywhere would suit me, except at home."

Married on the Ohio.

Frank Allen and Mattie McCarty of Pendleton county, Ky., wanted to marry, but Miss McCarty's father said "No." So they ran away. They hurried to Felicity, and then sent a messenger, who rode all night that he might get a license at Batavia, O. About the time this was done the cruel parent arrived at Felicity with a loaded shotgun. The young folks were on the lookout, and as he rode into town they rode out. They went to Chilco, on the Ohio river, and were joined by "Squire Ware, who hurried them into a skiff and out on the broad stream. Once afloat, he made them man and wife in a jiffy, just as McCarty appeared on the bank. The old man raised his gun. "Squire Ware yelled, "Too late, old man, the jobs done." The gun fell from the stern Kentuckian's hand, his jaws relaxed and he went back to the village saloon. The happy couple never stopped till they reached the Kentucky side.

A Swiss Delicacy.

Try this Swiss roll: Two eggs and three weight respectively in butter, sugar and flour. Cream the butter and sugar; add one egg and half the flour and beat well; then add the second egg and the remainder of the flour. Cover a dripping pan with buttered paper, spread the mixture thickly on it and bake in a moderate oven until firm. Sprinkle a dish with powdered sugar and turn the roll upon it. Spread some jam or preserve evenly over the surface and roll the cake up quickly; sprinkle it with powdered sugar and serve cold. For this sort of cake and for small cakes and cookies a sheet of iron is very useful. It should be made nearly the size of the oven and have the short ends rolled over stout wire or else turned down so that it may be easily removed from the oven.

He Was Tired.

"Do you ever have a dreadful tired feeling come over you?" asked a patent medicine distiller of a friend, who complained of not feeling well.
"Oh, yes; often," replied the friend.
"You should try a bottle of my cure-all. How often do you experience this tired feeling?"
"Every time I see your advertisement on the fence."

SNOR STRUTS.—You know the Tetterbugs. Are they—a quite sort of people one can ask to one's house, and wonder how they got there, if you wish to. Whether they'll come or not is another question." —[Punch.

Mr. H. M. Stanley.

It is impossible to gaze upon the bronzed features of Mr. Henry M. Stanley, without a vivid recollection of the famous picture of his first meeting with Livingston in the depths of the Dark Continent. "Dr. Livingston, I presume?" was the historic phrase in which the second greatest of African explorers greeted the greatest. One of the peculiarities of photography is that it adds stature; and I had pictured the founder of the Free State of the Congo as a tall, thin, wiry man, grizzled with hard work—with, in short, all the outward attributes of an old campaigner. But when he presently joined me in the cosy drawing-room in New Bond street, a gentleman somewhat below the average height, with a thick-set frame indicative of great powers of endurance, the well-known short moustache, and a face deeply browned by tropical suns as they shown upon forests and plains where no other white man has ever set foot, there was no need for introduction. Mr. Stanley greeted me cordially, and settled himself down in an armchair as though, instead of having upon his shoulders the care of a State covering a million and a half square miles, he had nothing to do but to be interviewed. Upon the table lay a Belgian map of the Congo, showing the results of the explorations which have been made since Mr. Stanley's departure for Europe, and the new volume of the *Album de Gotha*, in which the Congo is for the first time included among sovereign States.

The world needs to be told that Mr. Stanley is enthusiastic in his view of the rich capabilities and the splendid future of the Congo. But he has not the manner of an enthusiast. His speech is calm, thoughtful, based upon facts and figures. When he wishes to enforce a point, or to clinch an argument, he leans forward in his chair and speaks with the subtle earnestness and the quiet energy of conviction. One of the most salient impressions the interview left upon me was that of a man possessing a boundless store of reserved force; capable of taking great decisions in a moment of supreme crisis; a man of boundless energy, with whom danger and difficulty have been constantly present, and in whom natural coolness and fertility of resource have been developed into an instinct.

ABOUT YOUR COMPLEXION.

Suggestions for Ladies who Want Beautiful Skin.

To obtain a beautiful skin one must begin and diet properly. But, fat, moist and greasy food of every kind must not be eaten. Coffee and tea must be given up, so must claret and all kinds of wine, and milk or lemonade substituted. Fruits and vegetables should be eaten in abundance, rich candies and cakes avoided, pie never should be touched, and pickles and acid food generally should be dispensed with. A woman who follows the above rules will find that her skin will become smooth and clear after several months have passed. Of course the diting must be thorough and careful. No improvement can be made unless it is.

A tablespoonful of sulphur taken every other morning for a week, and then taken every other morning for a week, is one of the best things to clear the complexion. It acts like magic. It should always be mixed with molasses or something that will clear it from the system.

Salt, a tablespoonful dissolved in a goblet of milk, is an old-fashioned recipe for beautifying the complexion. It certainly is a simple remedy, and if it does not help the complexion it will strengthen the system. A great deal depended upon the constitution of the person and the kind of complexion she has. What will help one woman wonderfully will have no effect whatever on others. One thing is certain, however, milk is always conducive to softening and whitening the skin, and it is a noticeable fact that girls who have never been allowed to drink tea or coffee, and who have drunk quantities of milk, are generally, when they reach the age of twenty, very beautiful complexions.

Boiling water is also one of the best things with which to keep the complexion in order. A tumbler should be drunk one hour before every meal. If it is disagreeable by itself the juice of half a lemon should be added. Sugar should not be used. Most women in Summer time are weary of their complexions, and when Winter comes and they go out to balls and parties they regret it. The sun is excellent for the complexion if it does not get too much of it. A little browning and freckling is oftentimes very beneficial, but when the face is exposed to too great measure of the sun's rays the skin is apt to become coarse. Veils, very thin ones, should always be worn at a seaside resort, and when the face is exposed to the salt and sun together are bad for the complexion, though excellent for the general health. The face should always be washed in water that has the chill taken off it. Warm water is not good for the complexion, despite all that has been said to the contrary; neither is real cold water. The one makes the skin flabby, and in time wrinkles it; the other roughens it. Oat meal and Indian meal water are both excellent for washing the face and hands in. The meal softens the skin and gives it a delicate flush which is very becoming. The majority of women will also find that salt water will help their complexions. Get ten cents of rock salt every month and wash in basin into which a good lump of it has been placed. Rain water is an excellent thing for the skin, and it is especially true as regards the face, saying that the "early dew of the morning will make like the face of an angel the woman who bathes in it."

Easily Answered.

You ask us, dear Harold McCormick, "Which is most desirable, money or fame?" This is the sort of question we used to answer with one hand tied behind us. The answer, dear Harold, is money. We live in a sordid age, when money, good hard, every day coin of the realm, talks in a loud argumentative tone of voice which the trump of fame, even at concert pitch, has never been able to drown. So long as society continues in its present condition fame will never buy a pair of unbleached cotton socks, a cheese sandwich or a gum coat. Fame is well enough in its way, but there isn't a street car line in town that would honor a draft on it for a bundle of exchange tickets. Men have been known to starve on it, but it has never enabled anybody to compete in an exhibition of fat men or send a shipload of bacon and tracts to the benighted heathen of foreign lands. Therefore, if you haven't made up your mind let us advise you gently, but firmly, to acquire money rather than fame. Fame is easier to absorb than wealth, and it may be amassed by such puerile means as jumping off a bridge, beating the record at roller skating or eating thirty and in thirty consecutive days, but it is money that whispers persuasion into the ears of the greedy world, and it is time you were finding out. Acquire wealth, and then honestly endeavor to become famous as the stingiest man in the world. Men have tried it and won.—[Philadelphia Press.

PHILADELPHIA AND READING RAILROAD.

Arrangements of Passenger Trains

MAY 30, 1886.

TRAINS LEAVE SHENANDOAH A FOLLOWS:

For New York via Bound Brook route, 5:38 and 7:30 a. m., and 12:53 p. m. Via Allentown, 5:33, 7:30 a. m., and 12:53 p. m.
For Philadelphia, Reading, 5:38 and 7:30 a. m., 12:53 and 3:05 p. m.
For Harrisburg, 7:20 a. m., 3:05 p. m.
For Allentown, 7:30 a. m., 12:53, 3:05 p. m.
For Potsville, 7:30 a. m., 12:53 and 3:05 p. m.
For Tanamony and Mahanoy City, 5:33 and 7:30 a. m., 12:53 and 3:05 p. m. Add 10 min. for Mahanoy City.
For Lancaster and Columbia, 20 a. m. and 3:05 p. m.
For Williamsport, Sunbury and Lewisburg, 7:30 a. m., 12:53 and 3:15 p. m.
For Pottsville, 7:30 a. m., 3:30, 7:30 a. m., 12:53, 3:05, 6:10, 9:15 and 10:15 p. m.
For Girardville (Rappahannock Station) 5:33, 7:30 a. m., 12:53, 3:05, 6:10, 9:15 and 10:15 p. m.
For Ashland and Shamokin, 7:30 a. m., 12:53 and 3:15 p. m.

SUNDAYS.

For Pottsville, Tanamony City, 7:45 a. m.
For Ashland, Mount Carmel and Shamokin, 3:05 p. m.

TRAINS LEAVES FOR SHENANDOAH A/FOLLOWS:

(SUNDAYS EXCEPTED.)

Leave New York via Allentown, 8:30 a. m., 3:45 p. m., via Bound Brook route at 7:45 a. m., 1:30, 4:00, 8:10, 12:53 and 3:05 p. m.
Leave Reading, 11:55 a. m., 6:10, 7:55 p. m. Harrisburg, 11:55 a. m., 6:10, 7:55 p. m.
Leave Lancaster, 7:30 a. m., 3:40 p. m.
Leave Allentown, 7:30 a. m. and 3:40 p. m.
Leave Potsville, 7:30 a. m. and 3:40 p. m.
Leave Tanamony, 7:30 a. m., 12:40 and 7:05 p. m.
Leave Mahanoy City, 7:30 a. m., 1:30, 4:00 and 8:05 p. m.
Leave Mahanoy City, 8:15 a. m., 1:50, 5:20 and 9:30 p. m.
Leave Mahanoy Plane, 6:30, 8:40 a. m., 2:15, 5:12, 8:40 and 9:45 p. m.
Leave Girardville (Rappahannock station) 6:40 and 8:40 a. m., 2:35, 5:30, 8:45 and 9:52 p. m.
Leave Williamsport, 3:00 and 1:00 a. m., and 12:00 noon.

SUNDAYS.

Leave Pottsville, 2:00 p. m. Tanamony, 2:45 p. m. Mahanoy City, 3:35 and 5:50 a. m., 2:15, 5:12, 8:40 and 9:45 p. m.
Leave Pottsville, 7:30 a. m. and Shamokin 7:10 a. m.

For Atlantic City.

Leave Philadelphia, pier 8, foot of Walnut street.

Week-days—Excursion train, 7:00 a. m. Accommodation, 7:45 a. m. and 4:00 p. m. Express, with parlor cars, 9:00 a. m., 2:30, 4:00 and 5:15 p. m. SUNDAY Accommodation, 8:30 and 9:00 a. m. Express, with parlor cars, 9:00, 8:00 and 9:00 a. m.

Returning, leave Atlantic City, depot corner Atlantic and Arkansas avenues—Week-days—Accommodation, 5:35 a. m. and 4:25 p. m. Express, with parlor cars, 7:00, 8:10 and 11:00 a. m., and 5:25 p. m. From Excursion House, Mississippi and Pacific avenues, 7:03 p. m. SUNDAYS—Accommodation, 4:10 p. m. Express, with parlor cars, 4:00, 5:30, 7:00 and 10:00 p. m.
J. E. WOOTEN, Ticket Manager.
C. G. HANCOCK, Gen'l Pass'r and Gen'l Agent.

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From Shamokin and Mt. Carmel.....\$5.50
From Centralia, Raven Run, Girardville and Ashland.....5.25
From Shenandoah, Mahanoy City, Delano 5.00

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FIREMAN AND ENGINEER.

An Unwise and Uncalled For Action by the Brotherhood of Locomotive Engineers.

In the last issue of the *Locomotive Firemen's Magazine*, there appears this editorial expression on the subject that is of intense interests to the craft: We repeat that for thirteen years the Brotherhood of Locomotive Firemen has sought to prepare men for the position of locomotive engineers. This it has done by methods recognized as eminently prudent and praiseworthy. That the Brotherhood of Locomotive Engineers should fail to recognize such a Brotherhood is anomalous to an extent which defies prudent characterization. It is fundamentally erroneous. It taboos the commonest courtesies of life, it is a vulgar thrusting aside of those urbanities which distinguish the gentleman from the boor. It degrades rather than elevates those who practice it. It is an exhibition of that vanity which distinguishes the Pennsylvanian, who "struck ile," and thereafter couldn't see a poor relation though he were seven foot high. But the Brotherhood of Locomotive Firemen care little for such things; nevertheless the position taken by the Brotherhood of Locomotive Engineers has developed in an attack upon the Brotherhood of Locomotive Firemen fruitful of indignation rather than contempt. It brings into view a purpose of such flagrant injustice as will, in our opinion, defeat itself. Do we hear the inquiry, what is this injustice? It is this, that no locomotive engineer who is a member of the Brotherhood of Locomotive Firemen shall ever become a member of the Brotherhood of Locomotive Engineers, and that no member of the Brotherhood of Engineers who is a member of the Brotherhood of Firemen is allowed to represent his division in annual convention. Why? In the name of all things decent, prudent and honorable, why? The question goes resounding through all the lodge rooms of the order and the echoing reply is, why? Why this blacklisting, this boycotting rule by the Brotherhood of Locomotive Engineers? Why this gratuitous stigma? What stain has the Brotherhood of Locomotive Engineers placed upon the escutcheon—the life and character of its members? It has demanded good character, sobriety, industry, soundness of limb and body. The fireman has been for years a member of the Brotherhood of Firemen. Every noble ambition has been cultivated. He has broadened in intelligence, habits of sobriety and industry have been fixed—fidelity to obligation has been developed into a principle of life and action. He numbers his Brotherhood comrades by hundreds. He is deeply attached to the history, the traditions, the associations of the Brotherhood. It has warmed him into a noble life—prepared him for the duties and responsibilities of engineer—and now, what? That by the fiat of the Brotherhood of Engineers, he shall never pass the threshold of a Division door, never wear the badge of the Brotherhood of Locomotive Engineers until he has renounced allegiance to the Brotherhood of Locomotive Firemen. Gods! if that is not blacklisting, what is it? If that is not boycotting, what is it? It is asking a man to disrobe himself of his manhood, of his self-respect, of his independence, of his liberty, for what? That he may enter the charmed circle of a division of the Brotherhood of Locomotive Engineers without the smell of a locomotive fireman upon his garments—and that is the lofty commendation the locomotive fireman receives from the Brotherhood of Locomotive Engineers. Look at it—turn it around—turn it inside out—view it from any possible standpoint, and the more you contemplate the astounding insult the more you discover the purpose of the Brotherhood of Locomotive Engineers to be the humiliation of locomotive firemen.

Miner's Safety Lamp.

At the last meeting of the South Wales Institute of Mining Engineers, Mr. Walker introduced a model of the Regent electric miner's portable safety-lamp. This apparatus consists of a case containing four cells of the Regent battery, to which is attached a three candle-power incandescent lamp and a switch for turning the lamp in or out. The battery will contain sufficient electrical energy to run the lamp a full power for ten hours, and still leave sufficient light for the miner to find his way about for another two hours. It will weigh 3 pounds in all when complete, and the only attention required will be to empty the liquid out, and pour in fresh each day and each week to replace the zinc plates. These operations take far less time, and are more easily performed, than the work of cleaning the oil lamps at present in use. The advantages claimed are: Much more light than given by the miner's lamps now in use; absolute safety; superiority to other forms of lighting by electricity; small weight for the light given for the time; and portability. The idea was considered by the members to be an excellent one; but Mr. Walker explained that the model he had prepared was in a crude state, and was considerably heavier than it would be when he had further time to perfect it.

Philadelphia.

Ledger:—As the month of September approaches the anthracite coal trade shows increased evidences of improvement. The general condition of the coal trade is much better than it has been for months past, and it certainly is in better shape than it was at this period of the season last year. New orders for fall shipments of anthracite have begun to arrive, and there is reported a much better inquiry for coal, particularly for the domestic sizes. Prices, too, are firmer, though the full amount of the recent advances in circular rates is not being obtained in all cases. As the housekeepers return to town the local retail business will, of course, improve, and, as the coal trade has been very dull during the Spring and Summer months, a lively fall business in supplying domestic consumers is anticipated. We learn that several mines operated by individuals, which shut down last month owing to their being worked at a loss, will resume operations about September 1st, the outlook now being promising. As already announced, the quota of production of anthracite for September has been agreed upon at 2,500,000 tons, being 500,000 tons more than the quantity previously agreed upon and actually mined in the corresponding month of 1885, which was about 3,250,000 tons mined and sent to market.

The total amount of anthracite coal sent to market for the week ending August 14, as reported by the several carrying companies, was 704,658 tons compared with 673,430 tons in the corresponding week last year, an increase of 30,228 tons. The total amount of anthracite mined thus far in the year 1886 is 18,252,732 tons, compared with 16,800,347 tons for the same period last year, an increase of 1,452,385 tons. The following statement gives the gross tonnage of each of the leading carrying companies for the week ending August 14, and for the year to same date, compared with the respective amounts carried to the same date last year.

	Week	1886	1885	Difference
Reading R. R.	301,457	8,546,279	7,951,987	1,594,292
Lehigh Valley	174,780	4,324,123	3,896,586	1,427,537
D. and Western	93,894	2,935,616	2,594,547	1,341,369
Shamokin	16,143	519,738	567,223	47,485
Und RR. N. J.	40,726	926,210	1,001,641	75,431
Penn'a. Coal.	37,362	826,391	742,331	84,060
Del and Hudson	76,290	2,432,301	2,097,346	334,955
Pa. and N.Y.	41,628	1,210,607	987,861	222,746
Cleaveland P.	18,896	1,253,463	1,799,233	545,770
Hon and W.P.	41,826	1,184,728	873,559	311,169
Son. and Wm.		469,190	322,897	146,293

The Pennsylvania Railroad reports that the quantity of coal and coke carried over its lines for the week ending August 14 was 298,507 tons, of which 228,377 tons were coal and 70,130 tons coke. Of the weekly tonnage 210,866 tons originated on the main line of the Pennsylvania Railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 9,146,545 tons, of which 7,070,278 tons were coal and 2,076,267 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading Railroad reports that its coal shipments for the last week, ending August 21, was 290,000 tons, of which 37,000 tons were sent to and 35,500 tons shipped from Port Richmond, and 33,500 tons were sent to and 27,200 tons shipped from Elizabethport. Vessels are in plentiful supply at Port Richmond, and freights are quoted at 1.05 and discharge to Boston, at 99c, and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 85c@90c, and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending August 14 were 76,763 tons, and for the year to that date 1,258,748 tons, a decrease of 395,627 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio Railroad and local points—Week, 57,101 tons; year, 960,373 tons; decrease, 222,770 tons; to the Pennsylvania Railroad—Week, 6514 tons; year, 165,648 tons; decrease, 88,097 tons. To Chesapeake and Ohio Canal—Week, 12,848 tons; year, 106,727 tons; decrease, 84,756 tons.

John Dougherty, of Mount Union, Pa., is reported to be engaged in the construction of a "rapid transit steamboat," by which he expects to "revolutionize travel by water." The boat will have two folding paddles, one on each side, sinking deep into the water. "The paddles will be open when going forward, so that they move the largest possible body of water, but the change in the backward motion will, by the agency of springs, close the paddles, and thus reduce the resistance to a minimum. There will also be under the centre of the vessel two propelling poles, which are intended to drive the vessel through shoal water by striking the bottom of the river." The inventor intends to make the trip to New Orleans from Pittsburgh and back, in a week. He believes his ocean paddles can be used also for ocean travel, and is said to be "confident that he will be able to reduce the time occupied in crossing the Atlantic by the shortest route, that from Southampton to Halifax, to twenty-four hours, and from New York to Calcutta to ten days."

Natural gas has not proved to be the great boon to Wellsville, Ohio, at least, that has been claimed for it. The manufacturers in that place as well as in East Liverpool, supposed that the supply of this gas was practically unlimited, changed their plants so as to use this fuel instead of coal, but only to find that the flow of gas was so weak that some of them either had to stop or resort to coal.

WATER IN THE SOIL.

Some Interesting Statements and Deductions Based on Experiments.

The following is an abstract of a paper in the *Zeitschrift für Bauwesen*, by L. Brennecke: The author gives the results of a number of experiments, which were undertaken principally with the view of determining the influence exerted by capillary attraction in diminishing the pressure of water in various kinds of earth, especially sand of different size and grain, and of clay, it being assumed that the water can only find its way by suffusion through the mass, and that there are no large fissures present. Reference is made to various authors as regards their opinion on this subject, and the amount of deduction under circumstances may be made from the theoretical pressure of ground-water in designing lock-floors, etc.

An observation—recorded by Beer—in regard to a filter-basin at Magdeburg, 1880, is quoted, bearing upon the amount of frictional resistance to water-pressure offered by the ground, even where, as in this instance, of coarse gravel. The basin in question, 178 feet in breadth, had been constructed with a concrete floor of 1 foot 7 1/2 inches in thickness, and kept filled with water. On the occasion mentioned, the water was pumped out to a level of 2 inches above the floor, when, a slight upheaval of a portion of the latter being noticeable, the basin was quickly refilled. The level of the external ground-water was seven feet 10 1/2 inches above the under side of the concrete floor, and the weight of the floor was equal to a column of water 3 feet 9 inches high; therefore, supposing the full pressure due to the height of the ground-water had been active, it would consequently have required a depth of water in the basin of 4 feet 10 1/2 inches, instead of 2 inches, to preserve stability.

Other examples of the varying resistances of different earths to water-pressure are mentioned, namely, the coal mine, Wormrevier, some years since, when carrying out some shaft repairs with the aid of pneumatic pressure, on reaching a depth of 47 feet below the surface of the ground-water in a saturated clay-sand, an air-pressure of 3 atmospheres, instead of twice that amount, was sufficient to exclude the water; and at the Rheinpreussen mine, near Homberg, in 1865, the caisson was sunk with a pressure of only 2 1/2 atmospheres to such a depth as was calculated to require a pressure of 7 atmospheres. In the latter instance, however, a sudden increase of the water-pressure led to a most disastrous accident by bursting the air-lock. It suggested that the water was held back for some time by the thick beds of clay that it was known had been passed through, but finally found its way through these by channels around the outer skin of the caisson. In the previous case quoted, the author is of the opinion that, as only half the calculated air-pressure was requisite, probably half the column of ground-water was supported by the air-pressure, and the remainder by capillary attraction. Details are given of the laboratory experiments upon sands of various sized grain, together with a number of formulas and tables, giving the corresponding height of the capillary column.

Anthracite Coal Tonnage.

The following is the statement of Mr. John H. Jones, of the Anthracite coal tonnage for the month of July, 1886, compared with same period last year.

This statement includes the entire production of Anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines.

	JULY, 1886.	JULY, 1885.	DIFFERENCE.
Phila'da. & Read. R.R.	949,568	971,067	21,499
Lehigh Valley R.R.	437,827	451,161	13,334
Del. & W. R. R.	320,122	455,110	134,987
Del. & Hud. Canal Co.	266,049	278,186	12,136
Pennsylvania R. R.	288,238	261,983	26,255
Penn'a. Coal Co.	99,852	136,145	36,292
N.Y., L. E. & W. R. R.	73,993	49,438	24,555
Total	2,433,348	2,801,006	367,658
	FOR YEAR 1886.	FOR YEAR 1885.	DIFFERENCE.
P. & R. Railroad	6,045,571	5,785,453	260,117
L. V. R. R.	3,249,798	2,918,038	331,760
Del. & W. R. R.	2,737,787	4,282,987	1,545,200
D. & H. Canal Co.	1,935,253	1,589,153	346,100
Penn'a. Railroad	1,897,995	1,812,488	85,511
Penn. Coal Co.	682,387	701,966	19,579
N.Y., L. E. & W. R.	408,021	309,240	98,780
Total	16,956,724	15,502,328	1,454,396

The stock of coal on hand at date water shipping points, July 31st, 1886, was 705,480 tons; on June 30th, 1886, 700,736 tons; increase, 4,744 tons.

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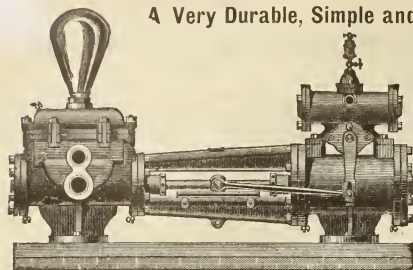
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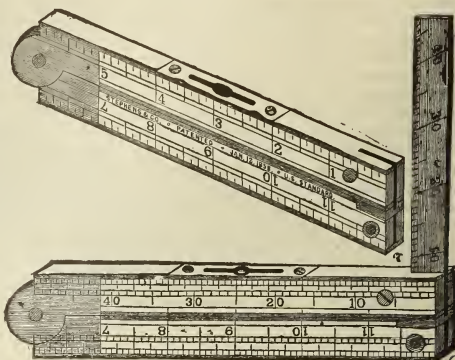
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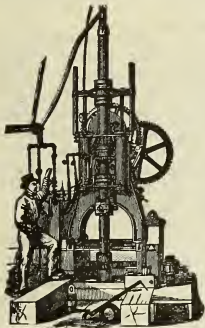
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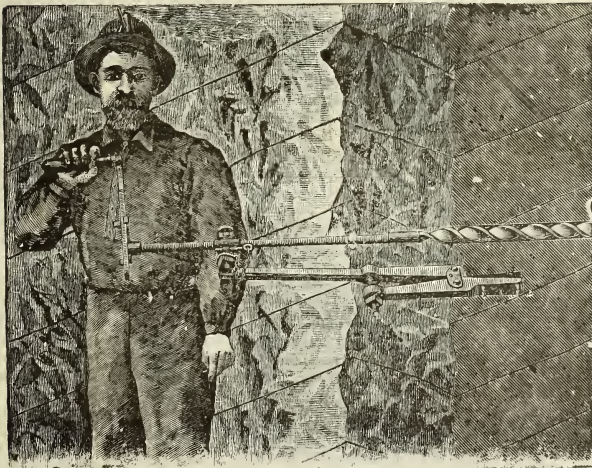
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FOR THE WEEK ENDING

SATURDAY, AUGUST 28, 1886.

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BUSINESS PROSPECTS.

The outlook for an unusually active Fall trade continues promising, what developments are being made in the business situation being decidedly in favor of increased activity in all branches of business. The threatened stringency in the money market promises to be averted by the imports of gold and unexpected calls for bonds being issued by the Treasury Department. Two calls for bonds already issued will return to the market a part of the money that the Treasury has taken from it since August 1. It is estimated that, out of the \$25,000,000 bonds called, as much as \$7,000,000 may prove to be not held by the banks, but even if this estimate should prove correct, the disbursements by the Treasury on account of the redemption of bonds will hardly be equal to the absorption of money during the past two months. The cash in the Treasury has increased over \$8,000,000 since August 1; thus the Treasury has taken out of the market during the current month more than the bond calls maturing September 15 and October 1 will restore to it. Meanwhile the New York banks have reduced their reserve, according to last week's report, from \$107,300,000 July 31, to \$96,269,000, August 21, showing that apart from all operations of the Treasury, the banks have lost \$3,500,000, which is but the beginning of the movement to the interior that should be expected at this season.

Treasury absorption and an increased demand for money to move the crops will continue for some time—the former, perhaps, indefinitely—but a crisis for the present is averted by the calls for bonds already issued and those likely to follow. The announcement has already been made that an additional call for \$15,000,000 of ten per cents. will be issued during the second week in September, and it is not unlikely that this may be supplemented by a call for ten millions more before the first of October.

These operations continue to give encouragement to the business situation, by dispelling the fears of a shrinkage of values resulting from a scarcity of money to meet the requirements of the growing trade of the country. Foreign imports show no sign of abatement. For the three weeks of August ending last Saturday they exceeded those of last year by 6 per cent. Domestic exports, on the other hand, show a falling off, and for August have been barely \$400,000 larger than for the same weeks last year. The issues of new silver certificates now being prepared are also intended to afford some relief to the money market and to relieve the affected embarrassment of the Treasury Department in getting silver into circulation. On the whole there is ample opportunity for supplying an abundance of money to meet the necessities of the trade of the nation, and if the Treasury Department does its duty, the danger of a check to business prosperity may be easily averted.

The movements in markets for products is generally healthy, and slightly inclined to higher prices. The sales of wheat last week reached the enormous aggregate of 50,612,000 bushels, and the price at the close was 1½ cents above that of the previous week. Corn also advanced slightly but oats dropped ¾ of a cent per bushel. Cotton also shows a slight advance, and lard, cheese, butter and eggs show the same tendency. The same may be said of nearly all other products, and transactions continue to increase in volume.

The iron market remains practically unchanged so far as prices are concerned; although the demand still shows a tendency to increase. Sales of steel rails were reported last week below \$34, but has since been contradicted. A foreign contract, however, for a considerable quantity deliverable at New Orleans, is reported on good authority. The coal statistics for the past month are encouraging, and the action of the companies in restricting the output for September to 2,750,000 tons meets with general approbation. This is 500,000 tons less than the amount marketed in September of last year, and would, therefore seem to indicate, that instead of increasing, the demand has diminished. It will be remembered, however, that the aggregate output thus far this year is nearly 2,000,000 tons in excess of the quantity marketed to the same date last year. Meantime prices have been advanced fifteen cents per ton, and the demand is daily improving.

"ORGANIZE, agitate, educate, arbitrate" are the keynotes of Powderly's labor policy, and when the Knights of Labor and laborers generally shall plant and maintain themselves firmly on that platform, they will be working in a sign that will conquer.

SOME of the low grade silver mines of the west are succumbing to the depression in the price of that metal.

THERE are continued indications that industrial circles will boom in a few weeks, and close on that will follow the long promised revival of commercial business.

ELECTRICITY is to be used in lighting up the coal works at Rock Springs, Wyoming. It is believed, and with reason, that danger from fire can thus be reduced to a minimum.

GOLD discoveries in New Mexico are attracting adventurous miners to that section. It will be well to await the verification of the finds before embarking too freely in that direction.

IT is a fact commendatory of American mine management that no such appalling disasters to life and limb occur as that in which in Leigh, Lancashire, England, on the 13th, carried desolation into scores of homes. A score of years ago they were only too frequent, but improved ventilation and other safeguards at the mines have rendered them no longer possible here.

IT WILL be of importance to soft coal miners and others to learn that the supreme court of Illinois, (Judge Schofield delivering the opinion), has declared unconstitutional the act of assembly requiring the operators of mines to provide scales, weigh coal and make that weight the basis of wages paying. There is little doubt that the decision will be repeated in this state if a test is ever made, so convincing is the force of the decision's logic. We shall give its text in full next week.

THE expiration of the time allotted to mine operators to provide themselves with certificated foremen, brings them face to face with the penalties of the sixth section of the act of assembly, which imposes a fine of \$20 for each and every day that a mine is operated without its foreman holding a certificate from the State department. It is presumed that their own interests, as well as a due respect for the law, have placed local operators on the side of safety.

WE are in receipt of a large and very carefully executed engraving of the new Standard Oil Company building, 26 Broadway, New York, which is noteworthy as the finest business structure on the greatest commercial thoroughfare of this continent. The enormous granite pile, 200 feet deep, and almost two hundred feet in height from foundation stone to pinnacle, is entirely given up to the executive offices of the company, which is entitled to credit for having added so imposing and enduring an example to the great commercial monuments of the metropolis.

THERE is apparently no truth in the statement that the Lehigh Valley and Pennsylvania Railroad Companies propose a consolidation of their powerful interests, to contest with the other coal lines for supremacy in the Anthracite trade. It has been asserted several times by poorly informed journals, that the two corporations contemplate a union this Fall, but interviews with prominent representatives of both companies settle beyond controversy the fact that no such movement is proposed. The harmonious co-operation of the Lehigh Valley and Pennsylvania lines does not necessarily mean a combination of power to gobble the lion's share of the coal business by any means, and should not be so considered by wise coal men.

THE passenger and freight traffic of the railroads traversing the coal region has increased very visibly this season. The transportation business particularly of the Lehigh Valley Company shows a much greater increase than that of other competitors. The steady import of Western trade to the Lehigh Valley road is attracting the attention of rival lines, the latter perhaps being apprehensive of the former road's popularity effecting an injury that cannot be repaired. The enterprise of the line founded by Asa Packer is deserving of much credit, for it is due to the energy and promptitude of the management of the Lehigh Valley Railroad that the immense carrying trade has been secured, which augments as the days lengthen and is destined to materially decrease the earnings of grasping and envious corporations.

IN TWENTY-ONE years of iron and steel manufacture we have increased our production 456 per cent., or almost doubly as great as any rival nation. Germany is next in rank with an increase, of 337 per cent. In 1880 the world's entire output of pig iron was \$25,000; last year it was 19,000,000. A marvellous increase.

THE recent decided improvement in the coal trade has revived the spirits of all in the business except the chronic croakers. This is shown in the now reported feeling among shippers that it will not be necessary to further restrict production in order to stiffen prices, the market showing firmness under the recent advance. It may be well, however, not to grow too enthusiastic over the present spurt.

IF IT BE TRUE, as claimed, that the Pennsylvania Railroad Company for its Schuylkill branch has been offered 3,000,000 tons of Anthracite coal freight it will be almost able to dictate freight rates on coal carrying from this region and will thus seriously hamper Mr. Gowen in his efforts to recruit Reading strength short of a complete reorganization by legal sale.

THERE is such an improvement in iron trade that an advance in prices is being discussed. Should these anticipations be realized the coal markets will be further stiffened, and increased labor and remuneration follow as a matter of course.

WITHIN the past few years the volume of our foreign trade has increased rather than diminished, especially in improved machinery. Prices in this country are said to be so low that foreign market had to be sought as a measure of safety for manufacturers.

ABOUT 75,000,000 bushels of coal have in the past six months been shipped from the Monongahela district of this State. This is said to be the largest shipment ever made, and is within 8,000,000 of last year's entire output.

OPTIONS are being extensively taken in the coal business of the western part of the State, and some of the speculators are likely to reap rich harvests therefrom. One syndicate controls over 4,300 acres, while it has several strong rivals.

CITY authorities announce a decided quickening of the business pulse, and after the pleasure seeking ends here we, too, shall feel the pressure of commercial activity.

Good Firm, Fine Goods.

S. L. Brown & Co., of Wilkes-Barre, Pa., are making a resolute and successful effort to introduce their excellent "Pearl Oil" for family use. It is guaranteed the best oil made from petroleum, standing a high fire test, absolutely safe and affording a brilliant light. They also do a large wholesale trade in the very best grades of lubricating, mining, machinery and burning oils, the quality of their goods and the lowness of their price quotations giving them special advantages in meeting trade wants. They are special agents for the goods of the Eclipse Lubricating Oil Co., whose Franklin oils are conceded to be unsurpassed in the markets anywhere. Mine and machine operators and dealers in oil should not fail to put Brown & Co. on their list for shipping furnishing.

The heirs of A. & W. Powers have brought suit for \$30,000 damages against Andrews Bros. & Co., of Hasleton, Ohio. In 1871 the plaintiffs refused the defendants the right of way to build a railroad track through their property to the Osborn coal mines, unless a royalty of 5 cents a ton was paid, whereupon the defendants obtained a charter for the Hasleton and Leetonia Railroad Company, went forward and condemned the land, taking possession of it. The plaintiffs allege that the "company" existed only on paper, and that the defendants never intended to build the road to Leetonia or anywhere except to the aforesaid coal mine. Over 363,000 tons of coal have been carried through the lands over the road, and the plaintiffs claim the above damages.

The Tredegar Iron and Coal Company, of South Wales, is now manufacturing for colliery purposes a strong, light, corrugated steel sleeper with a special steel clip for fastening. Two holes are punched in each end of the sleeper, and the steel clips are put in after it is laid, the rail being keyed up by a steel taper key. The corrugated sides of the sleeper, with the two projecting flanges at either end, enable it, when laid down, to become very firmly attached to the ballast or road, thus preventing any movement when loads are passing over sharp curves.

A Profession or a Trade.

But, as I told you at the outset, if you have arrived at the age of fifteen or sixteen, it is time you looked matters square in the face and had some idea of your future. If you were to answer at once you would say that you would take a profession in preference to a trade. A profession means several years of hard study, quite a large cash outlay, and then trials and rebuffs to get a start in business. It is one thing to graduate as a lawyer or a doctor, and quite another to pick up clients and patients. If you have fully determined on a profession, be careful of your move. If you have a large head, your grandmother has doubtless many times exclaimed: "What a great lawyer this boy would make!" Don't try to make one on the size of your head. We've got any number of that class in the country now, and they can't pay their grocery bill. If you can put a sliver out of your finger without winking, it may be a sign that you would make a great surgeon. It may also be a sign that you are born to be a butcher. How will you know what to pursue? Your own feelings are the safest guide. If left to your parents and to circumstances you may be forced into a trade or profession which you can never make a success. When you come to realize that you must make your own way in life your particular forte will be apt to reveal itself. One of the best lawyers in Detroit was intended for the ministry; another served three years as a journalist, but all the time, feeling that he was out of his element; another was forced by his father to learn the trade of harness maker. I know a machinist who at first studied medicine; of a watchmaker who tried to become a lawyer; of a carpenter who threw away three years of his life trying to become a dentist. After you have selected your profession or trade, what then? Strive to master it all its details and excel. If you become a carpenter don't be satisfied when you can saw and plane and match. Don't be satisfied with \$2 per day. Make yourself worth \$3. Master details and push yourself from carpenter to builder. Don't imagine that a man in search of a lawyer walks down the street and stops at the first sign hanging out. It is the lawyer who has numbered above his fellows that he seeks out. If our friends are ill we want the best doctor. We want the man who has made himself the best by study and energy. The blacksmith who is content to mend old wagons will never win a new one. The machinist who stands at the lathe to do about so much work in ten hours need not hope to better off. It is the men who put their heart into what they do who succeed.—*M. Quad.*

Famous Gold Mines.

Nevada county is the chief of all the mining counties of the State of California. It has a middle situation in the State, but is generally ranked as a northern county. The summit of the Sierra Nevada runs through the county, the towns of Truckee and Boca being east of those mountains, and within Nevada county. The chief industry is mining, although farming is carried on with profit in the western part of Nevada county. No equal area in the world has produced more gold than has Nevada county, and no region known has the promise of an equal mining permanency. The gold is found in both quartz ledges and gravel beds. The great gold-gravel region of the county is in the townships of Bridgeport, Bloomfield, Eureka, Little York and Washington. These are of immense extent, and of incalculable richness. These beds are worked by the hydraulic process for the most part, and enormous values of gold were washed out of them. The hydraulic process of working mines is now under the ban of the law, but doubtless a way will be found for lawfully taking the gold from these rich gravel beds. There are some gravel mines in Nevada, Grass Valley and Rough and Ready townships, but they are not extensive, excepting at Mooney Flat, in Rough and Ready, where is the extension of the famous gravel leads of Timbuctoo, Smartsville and Sucker Flat. The most famous of the present active quartz mines are at Providence and Wyoming of Nevada City district, and the Idaho, Empire, North Star and Crown Point of Grass Valley district.—*Grass Valley Tidings.*

Statistics of Great Britain and Ireland.

These statistics show that during 1885 the whole number of persons employed in and about the mines of the United Kingdom of Great Britain and Ireland amounted to 561,667. This shows a falling off from 1884 of 2820. The decrease is among the persons employed in metalliferous mines only, as the number employed in the coal mine shows a slight increase over '84. It is pleasing to be able to note even a very slight decrease in the number of fatal accidents during the year. The number of fatal accidents was 866, and the number of deaths occasioned by them 121, showing a decrease for the year of 51 in fatal accidents, but an increase of 216 in lives lost. The proportion of deaths, however, is 1 to 462, whereas the average proportion of the preceding three years was 1 to 458. The production of the year has been in nearly all branches considerably better than that of the year previous, with the exception of coal, which shows a decrease of nearly 1½ million tons; iron ores, with a decrease of three-quarters of a million tons; copper ores, with a decrease of over 5000 tons; and salt, with a decrease of 125,021. Under the head of salt production, we find that of the total amount only 190,480 tons were rock-salt, the remainder being salt obtained from brine. Of the latter, 111,600 tons were consumed in the brine used for making alkali under Solvay's ammonia process.

Railroad Connection in the South.

Rumors are rife in railway circles, says the *New Orleans Times-Democrat*, in connection with the rapid development of the Mississippi Valley railway system, in various and in some cases antagonistic interests. It is said that there is good reason to believe that Mr. Jay Gould does not much like the extension of the Kansas City and Fort Scott line to Birmingham, Ala., and that he has determined to project a counter movement in the same direction. This may or may not be true, but it is suggestive that a number of prominent people, usually identified with the schemes of the railway king, have been looking carefully into the resources and traffic possibilities of the country between Memphis and Birmingham for some time past. A million and a half dollars of English money have been put into the scheme to build the line between Birmingham and Sheffield, according to report, and it is believed and speculated upon that a huge syndicate has been organized in New York and Boston to establish steel works in connection with that enterprise and the Pratt Coal, Coke and Iron Company. The combined effect of these proposed adventures appears to be to set the American railway world wild for southern extensions and alliances, and it is a safe prediction that the future causes of war between trunk lines will be the Mississippi Valley rather than the western trade. The Pennsylvania Company is credited with a determination to get down our way on an independent basis, and pretty nearly every first-class railway interest seems bent upon reaching the sunny waters of the gulf by hook or crook. All this, of course, is natural enough. There is nothing plainer to the minds of railway strategists than that the Mississippi Valley, both on account of its own wonderful development and its natural position in relation to the coming south and north trade of the hemisphere, and the future American trade with the Pacific via the Isthmus of Tehuantepec, must necessarily become the richest field for traffic operations in the world.

Electric Light Fire-Damp Indicator.

At the June meeting of the Physical Society, a paper on this subject, prepared by Messrs. Walter Emmott and William Ackroyd, was read, the following being a short abstract: The Royal Commission on Accidents in Mines points out, in its recently issued report, as a serious objection to the use of the electric light in mines, notwithstanding its many great advantages, that the light of an incandescent lamp, being produced within a vacuum, can not admit of any device for the indication of fire-damp, such as is given by the Davy, for example. The present apparatus is the outcome of an attempt to overcome this difficulty. It consists of two incandescent lamps, one with colorless and the other with red glass, and the circuit is so arranged that in an ordinary atmosphere the colorless lamp alone shines, but in fire-damp this goes out and the red one is illuminated. This is effected in a simple manner by the motion of a mercury contact occupying the lower part of the curved tube, one end of which is opened and the other connected with a porous pot of unglazed porcelain, the motion of the mercury being due to the increased pressure in the porous pot occasioned by diffusion.

A French mining engineer concludes that the degree of tenacity of coal-dust plays a great part, but the result depends principally on the chemical composition of the coal. "Coals containing from 16 to 24 per cent. of volatile matter seem more dangerous than either poorer or richer qualities. The ignition is propagated between two distinct spaces, each containing either coal-dust or explosive gaseous mixtures, not only when they are placed in communication by a train of dust, but even when they are separated by a considerable distance free from fire-damp or coal-dust. The ignition of dust may be induced by an explosion of fire-damp, as well as by a blast, and the explosion may be occasioned on firing a blast by electricity, as well as by a safety-match or a port-fire. With dynamite, there is less danger, and with gun-cotton dissolved in nitro-glycerine practically none, if it is ignited by means of a cap of sufficient force."

In New South Wales, a variety of canal coal, commonly called "kerosene shale," similar to the once famous Boghead mineral of Scotland, but yielding a much larger percentage of volatile hydrocarbons than the Scotch Boghead, occurs in saucer-shaped deposits from a few inches to 5 feet thick. The richest quality yields upward of 150 gallons of crude oil per ton, or 18,000 cubic feet of gas, with an illuminating power of from 38 to 48 sperm candles; and on this account it is found advantageous for mixing with ordinary coal in the manufacture of gas, and is largely exported to Great Britain, America, and other foreign countries, as well as the neighboring colonies, for gas purposes. Two companies manufacture from it petroleum oil and other products. The quantity raised in 1885 was 31,618 tons, valued at £71,176.

The meeting of German mine owners next month will be of unusual importance, in view of the crisis in the iron trade. The journal 'Stahl Und Eisen,' discussing the English rivalry to the home producers, says it is a competition involving life or death, and appeals to German railway companies to not accept English tenders for metal to the prejudice of the German industry.

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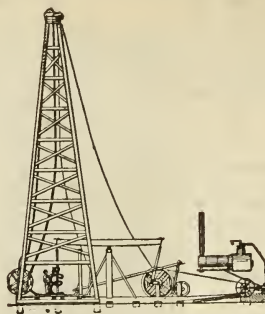
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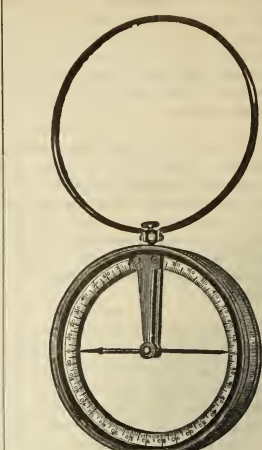
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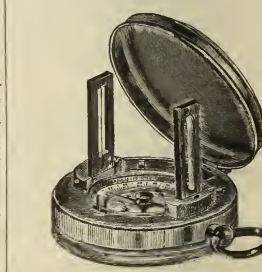
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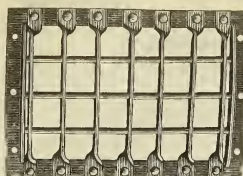
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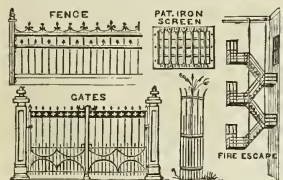
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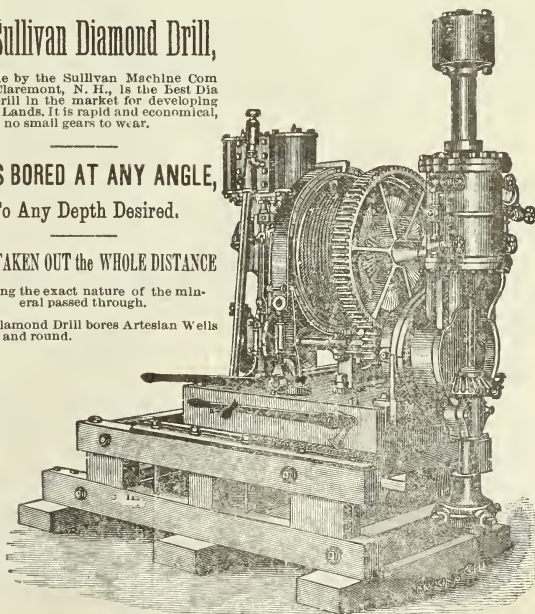
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CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

He Finds an Error.

Editor Mining Herald and Colliery Engineer:

SIR:—Reading over the questions and answers prepared by Robert Mauchline, in your issue of July 31, 1886, I found the following question:

Two airways have each an area of 64 square feet, and their length is 3,000 feet; one being circular the other square. Is there any difference in their rubbing surface?

In doing the question I find the square airway to be all right, but in working out the circular airway problem according to Mr. Mauchline's formula I find it to be wrong. The following is Mr. Mauchline's figuring:

$$\frac{\sqrt{64}}{7554} \times 3.1416 \times 3,000 = 84711.7$$

and this is mine:

$$\frac{\sqrt{64}}{7554} \times 3.1416 \times 3,000 = 85011.7$$

I would like very much to know through your paper if I am right or not; and the way to get Mr. Mauchline's answer, if he is right.

Yours Truly,

LEARNER.

Hollywood, Pa., Aug. 18, 1886.

Mining Question.

Editor Mining Herald and Colliery Engineer.

If you have a pump, with a water discharge of 3 in., at the bottom of a shaft 50 ft. deep, will it require more force to raise the water through a 4 in. pipe than a 3 in. pipe, and if so, how much, the quantity of water discharged being the same? I hope that a few of your correspondents will respond.

Yours, &c.,

INQUIRER.

Centralia, Aug. 20, 1886.

Editor Mining Herald and Colliery Engineer:

SIR:—I would be very thankful if any of your able correspondents would kindly name me a person, through the medium of your valuable paper, who prepares candidates for obtaining a certificate for mine management through correspondence.

Yours, &c.,

PUPIL.

Shamokin, Pa., August 20, 1886.

Editor Mining Herald and Colliery Engineer:

SIR:—Kindly insert the following in your next issue, hoping some of your able correspondents will answer:

- (1) What is the perimeter of the elliptical shaft, the axis of which measures 16 ft. and 12 ft?
- (2) If a heading, A to B, rises 5 in. per yard for 50 yards, from B to C 2 in. per yard for 30 yards, what is the inclination from A to C, and the depth of cutting at B?

Yours, &c.,

J. R.

Minersville, Aug. 16, 1886.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any of your able correspondents answer me the following questions?

- (1) Suppose you were sinking a shaft through running sand and you came on a very large boulder, how would you proceed?
- (2) Describe the process of sinking through marls, metals, flinty rock and burr.

Yours, &c.,

VALEO.

Latrobe, Pa., Aug. 14, 1886.

Editor Mining Herald and Colliery Engineer:

SIR:—(1) What would be the power of a high-pressure engine, with two cylinders 30 ft. diameter, steam pressure 40 lb. and 3 ft. 6 in. stroke, friction 1-30th?

(2) Give size, description, length of stroke, diameter of cylinder of a winding engine for 1,000 tons of coal in ten hours, from a pit 600 yards deep; also size of pulleys and rope, &c.

(3) A shaft 250 yards deep makes 150 gallons a minute, what power would be required, and what size of pumps?

(4) If ten men can clear a drift 20 yards long, 6 ft. wide, 4 ft. deep in seven days, at ten hours a day, how many days will it take fourteen men, working eight hours a day to clear 50 yards of a drift 8 yards wide and 5 feet deep?

Yours, &c.,

A. C. S.

Youngstown, Ohio, Aug. 18, 1886.

WIRE CABLE SPLICE.

An Invention That Overcomes a Long Standing Drawback In This Form of Transmitting Power.

Thomas C. Nash, of Chicago, formerly of St. Clair, Schuylkill Co., Pa., has invented a valuable method for splicing wire cables, and letters patent were granted to him in July last. This invention is of especial value at this time when cable railways are acknowledged to be a success not only mechanically, but economically also. The value of the invention by Mr. Nash will be apparent to the public as well as corporate bodies when it is understood that a successful splice is vital to the operation of a cable road. C. B. Holmes, president and superintendent of the Chicago system of cable roads, at an annual meeting of the stockholders of said company, said: "All of the splices known to the trade were tried upon our lines, and proved to be failures. Mr. Nash, who has charge of our cables, then introduced a method of his own, and with anxious interest its operation was watched until long-continued use has determined its advantage and success. The difficulty was to secure a splice which would not increase the size of the cable at the point of splicing and expose the splice to abrasion by the grip; which would not draw out when a heavy strain was brought to bear, nor yet allow the ends to loosen when the action of the cars produced a slackness of the cable; one also which would not allow one strand to creep ahead of the other and project up for the grip to cut or tear it up. If nothing else had been done during the season in this department than to discover a successful method of treating this important part of the system, it would have been a season well spent, for it is vital to the operation of the road."

Though not generally known to the public, the Chicago system of cable roads, with its costly and extensive plant perfect in every other detail, would doubtless have proven a failure without the introduction of this splice, for prior to that time the cost of broken cables, arising from defective splices, was so great as to consume a great portion of the profits of the Company; but with the introduction of this invention this was changed, for by it a splice in a cable was as good as any other portion of the line. This splice, in all cases, lasts nearly the full life of a cable, or about twelve months. Mr. A. E. Hovey, of Chicago, latterly of San Francisco, and one of the most successful engineers in the construction of cable railways, says that "with this invention cable railways are a perfect success; no cable road can be run successfully without this splice. Briefly it may be described as follows: A cable generally consists of six strands (in some cables there are 16 and 19 wires, while in others 31 wires to the strand), wound about a core of some fibrous or flexible material, and when a splice is to be made, both ends of the cable at a distance of 17 feet from each end, are unlaid and the ends brought as close together as the laid portions will permit, with the unlaid strands of each end of the cable locked or laid between the opposing ends of the other portion, which operation so far is the usual method employed in splicing wire-cables."

Mr. Nash's invention, however, begins from this point, and has to do only with the disposition of the meeting ends of the strands. Each strand is composed of, say, 31 wires, 19 wires forming a core and the remaining 12 outside wires, and when the ends of two strands are brought together the outside wires are then in turn unlaid and the inside wires tied together, and the terminals or ends of both the inside and outside wires of the two opposing strands are tucked in an untwisted condition in the body of the cable between the strands thereof, thus making 24 wires point 22 wires knotted and tucked, or 31 wires more than belong in the cable. At this point a complete strand is in fact tucked away without any perceptible increase of diameter in the cable.

The Chicago City Railway Company have purchased the right for this splice on all of their lines. It is also in use and endorsed by the following companies: Chicago City railway company, Cincinnati, St. Louis, Kansas City, Hoboken and New York cable railways. It is also endorsed by the Huz Manufacturing company, the great and extensive wire-rope works at Wilkesbarre, Pa. This splice will also be of considerable interest to mine and mill owners where wire cables are in use for the transmission of power.

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F. M. Co. Box 115, Newport, Ky.

SCIENTIFIC SUBJECTS.

INCREASE OF THE TEMPERATURE OF THE EARTH.

A remarkable example has been presented at Pesh, where the deepest artesian well in the world is that now boring for the purpose of supplying the public baths and other establishments with hot water. A depth of 3120 feet has already been reached, and it furnishes 176,000 gallons daily, at a temperature of 70 degrees Cent.—155 degrees Fahr. The municipality has recently voted a large subvention, in order that the boring may be continued to a greater depth, not only to obtain a larger volume of water, but at a temperature of 80 degrees Cent.—176 degrees Fahr. It is suggested that it is thus within the bounds of probability that the time may come when a brewer will obtain his water supply from a well of sufficient depth to yield "liquor" at the mashing temperature.

DAMMING BACK WATER FLOW.

L. Tietjens, of Stassfurt, Germany, has recently patented a very ingenious method of damming back the flow of water in shafts by the application of the well-known fact that certain salts increase their volume very materially by the absorbing of water of crystallization in hardening. To accomplish this he takes either calcined soda, anhydrous alum, kieserite, or oxychloride of magnesium, mixes them into a paste, and then immediately injects them through a suitable arranged pipe into the fissures through which the water flows. As this paste hardens, it swells enough to fill all the interstices of the rock and to render it thoroughly water-tight.

ELECTRICITY ON ROOTS.

An interesting experiment, showing the influence of electricity on the growth of roots, has been made in Germany by Professor Hoeffies. Plates of copper were thrust upright into the earth, and connected by wire with similarly placed zinc plates, about one hundred feet distant, an electric battery being thus formed with the earth between such copper and zinc in the circuit. Both potatoes and beets, planted between such plates, gave an increased yield—beets fifteen per cent., potatoes twenty-five per cent.—as compared with other parts of the same field.

FIVE MASTED SHIP.

It is a curious circumstance, too, that an inventor early in the present century proposed a five-masted sailing ship—a recommendation we have approached to the extent of four masts in some of the great iron clipper merchantmen, and exceeded to the extent of a sixth mast in one or more armor clads. Even the Calais-Douvres was anticipated two centuries since by Sir William Petty, who built a twin ship of which some very curious accounts are still extant. But the last of the wooden ships has been sold out of England's navy, and the song writer and the romancists must look in sober earnest at the twelve-inch plates and 10,000 tons displacements for inspiration for all future work concerning the pride of the ocean and the home of the brave.—*London Telegraph*.

TO REDUCE ANTIMONY.

A new method has been introduced in England by N. J. Cooksok. In a tank lined with fire-brick, he places the antimony ores, or crude antimony, and then molten iron is poured in. This decomposes the sulphide, by the formation of ferric sulphide, which floats on top, and can be skimmed off. Instead of metallic iron, molten pyrites may be used, provided the percentage of iron in them is larger than in pure monosulphide.

Delaware, Lackawanna and Western Shipment.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Aug. 21, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	61,251.181	1,324,400.06
Shipped South.....	43,341.066	1,715,808.19
Total.....	104,592.04	3,040,208.05
For corresponding time last year.		
Shipped North.....	60,883.19	1,268,464.01
Shipped South.....	69,887.07	1,466,569.33
Total.....	130,873.06	2,725,120.14
Increase.....		315,085.11
Decrease.....	26,280.02	

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

The growth of the iron-smelting business in the States of Tennessee and Alabama since 1880 has been phenomenal. Six years ago the total capacity of the coke stacks in the two States could not have exceeded 150,000 tons; it is now quite 550,000 tons, and no less than 11 large stacks are under way and projected, all to be built within the next 20 months. No such development, observes a Southern contemporary, can be found in the history of our national industries.

RAILROAD FACTS.

INTERESTING FIGURES SHOWING THE RESULTS OF RAILROAD CONSTRUCTIONS AND OPERATION.

There are now about 125,000 miles of railroad in this country, and this is by good judges considered to be much more than the country ought to have. Some time ago it was a common saying that it required 1,000 people to support one mile of railroad. We have now more than a mile to every 500 of our population, and the building of railroads in this country and in Canada is unparalleled anywhere else in the world. The first railroad building in this country was in 1830, when we had only twenty-three miles in operation. In 1840 there were nearly 3,000 miles of railroad in the United States, and in 1850 this had increased to about 10,000 miles. Between 1850 and 1860 railroads went ahead faster, and when the war broke out there were about 30,000 miles in operation.

During the war there was little building of railroads, and before this time it was seldom over 1,000 miles of road was built in a year. After the war closed we began to build much more rapidly, and in 1871 we reached the high-water mark up to that time, which was over 7,000 miles increase for that year, and when we had 60,000 miles of road in the United States. Within the next fifteen years we have built more roads than we did in the forty years of railroad building preceding that time. Railroad building has been spasmodic in this country. We have a season of railroad speculations and then a season of panic. From 1870 to 1873 we built from 4,000 to 7,000 miles every year. Then came the hard times and we fell in 1875 to less than 2,000. In 1879 we got up to 4,000 again, and in 1882 we reached the enormous amount of 11,500 miles of new road during a single year. When it is considered that the average cost of construction and equipment of each mile of railroad is over \$50,000 it will be seen what an immense amount of capital the enormous construction of 11,000 miles of road amounts to. It means in round numbers at least an addition of half a billion of money to the capitalized corporations of the United States. In 1883 we built between 6,000 and 7,000 miles of road and we have now got down to between 4,000 and 5,000.

"Poor's Manual" for 1885, just issued, gives many useful tables of earnings, dividends paid, values, mileages and capitalization of the lines in the United States. It gives the total mileage December 31, 1885, at 128,967 miles, an increase for the year of 8,131 miles. The total capital stock funded and floating debts of these lines were \$8,073,573,394, and the assets \$214,261,220 greater than the amount. The gross earnings of the companies were \$765,310,519; net earnings, \$266,488,993, of which \$179,681,323 were paid for interest on bonds, and \$77,692,105 for dividends. The average of passenger earnings per mile was 9,138,675.595, and the number of tons of freight moved one mile 49,151,894.569. The average capital stock per completed mile of road is worth at par value \$9,867, and the bonded debt \$20,453 per mile. The average cost of road and equipment is given at \$55,059 per mile.

The average gross earnings per mile was \$6,266, as compared with \$6,663 per mile in 1884, and the net earnings \$2,185 per mile, showing a percentage of expenses to earnings of 65.12. Of the gross earnings 26.3 per cent. were earned by passenger traffic and 67.4 by freight, the balance being for mail, express, etc. Each passenger was hauled an average of 26 miles and each ton of freight an average of 112 miles. The average interest paid on bonds was 4.77 per cent. against 4.66 per cent. in 1884, and on stock in dividends 2.02 per cent., against 2.45 per cent. in 1884, making the average net revenue from bonds, stock and debt of 38.3 per cent. The average charge for moving a ton of freight a mile was 1.057 cents, against 1.121 cents in 1884, while the amount carried one mile increased 37,965,350 tons.

The report concludes with the following remark:

"The past year undoubtedly marks a point of lower depression in the earnings of our railroads in ratio to their cost and mileage than is likely to be witnessed for some years to come, the

present year showing a considerable improvement upon the past."

A new feature of the report is the table giving the highest and lowest quotations in the leading stock exchanges of the country of the stocks and bonds actively dealt in for the past eight years, together with the dividends paid since their organization.

COAL PROJECTS.

WHERE AND HOW CAPITAL IS BEING INVESTED IN MINING.

J. W. Moore and Company, of Greensburg, are leasing a field of coal in Rostraver township, Westmoreland county. It is proposed to mass a large amount of valuable contiguous territory on a year's option.

A coal shaft at Saltsburg, Pa., was sunk to a depth of 480 feet, and then stopped. The coal obtained was of an inferior quality, while at that depth the gas made working extremely dangerous.

Grading for 130 more ovens has been commenced at the upper end of the Standard works, near Connellsville, Pa. When completed this plant will have 700 ovens and be the largest in the region.

M. K. Saulsbury, representing Dr. Hostetter and several other capitalists, has accepted options on nearly eight hundred acres of coal lands between Latrobe, Pa., and Youngstown, Ohio. This last purchase exhausts the marketable coal between Mt. Pleasant and Latrobe.

Irwin, Pa., is to have another large coal company. A gentleman representing an eastern syndicate has made overtures to the parties owning 2,000 acres of coal land lying between the Youghiogheny and the Baltimore and Ohio railroads, and it is understood the transfer will be made.

Messrs. Barger & Pryne, who have been working the Fiedler coal mine, near Boonville, Mo., recently sunk a shaft, and at a depth of 45 feet struck a vein of canal coal, into which they have worked to the depth of over 10 feet.

The new operators of the old Clark mine, at Chapman, Ohio, have bought out the Youngstown Coal Company, and will assume the name. The large pump has been started and the water is lowering fast.

CURRENT COMMENT.

PASSING NOTES ON MATTERS TRANSPIRING IN THE MINERAL AND INDUSTRIAL WORLDS.

Coke manufacturers will try to ship coke to the furnaces in northern Mexico and Arizona. In the former market English coke controls the trade.

The almost complete disappearance of the recent enormous New York bank reserve is taken as the surest proof of a general improvement of business.

According to the State Geologist, Pennsylvania still has an Anthracite coal deposit of five thousand million tons to draw upon and when that is exhausted, the mountains of waste that comes from the breaker contains millions of tons of available coal that was deposited upon them twenty-five years ago when coal mining was not carried on with the painstaking method of to-day; then too, the present unsightly dirt bank will not remain much longer an unsolved problem of fuel.

The Black Hills loom up as a rival to Cornwall, Australia, and Sumatra in the production of tin. The tin ore that is now being shipped East from the Hills is believed to foreshadow an important development of the mineral resources of the country. We have an inexhaustible supply of all other leading metals in use in the civilized world, and if we can add tin to our number it will materially increase our economic independence.

The American Iron & Steel Association predicts that this country will make in this year more Bessemer steel, more steel rails, and more open-hearth metal than it ever produced before. The outlook so far as prices are concerned is less promising.

The *Messenger* believes that the immense beds of coal in the northeastern part of Indiana County, Pa., will soon find a market.

Alabama will rank among the first states this year in railroad building.

Work at the Antrim, Pa., mines has been better this summer than for some years past. A new drift for the wire rope is progressing, and will be ready for operation by the first of September.

Three of the mines of W. L. Scott & Co. have signed the Columbus scale, 71 cents per ton over an inch and a quarter screen, and the other three the Westmoreland scale, 55 cents, over a half inch screen.

The Arnot, Pa., miners are all working full time, producing about 1,700 tons of coal daily. Two hundred coke ovens are now in full blast, and there is no coke on hand. It is being shipped as fast as produced. Fifty new ovens are being built.

Henry Louttit, Mine Inspector of the Monongahela City, Pa., district, proposes to call a convention of the mine bosses of the district to meet there early in September. It is proposed to hold a quarterly institute, of which this will be the first. At these meetings papers will be read and practical mining questions brought forward for discussion. The object of the assembly will be to give an impetus to the study of theories and new ideas, to compare notes, arrange plans for future action, and thus carry out the design of the law in more fully meeting all its requirements.

IN SHAPE AGAIN.

THE NEW AND POWERFUL MACHINERY ERECTED FOR OPERATION OF THE MAHANOV PLANE.

On the 29th of last January, the engine house and attachments, the property of the Philadelphia & Reading Railroad Company, situated at the head of Mahanoy Plane, were destroyed by fire. The engines and machinery were originally constructed in 1860, at the shops of George W. Snyder, Pottsville, Pa., with consummate care and at great cost, and at the time of their completion had no superior for finish or mechanism in the country, and were so seriously damaged as to determine the officers of the road to replace them with others, more modern, powerful, and better adapted to the altered wants of trade and times. With characteristic energy, work was speedily commenced on the erection of a new building, and on the machinery at the company's Pottsville shops and pushed with so much alacrity that on the 17th inst., the new and magnificent engines, propelled by a full complement of steam were put in motion, and found to work with such perfect precision as to give entire satisfaction to all who were directly interested in their construction.

The old engines which had thirty-four inch cylinders by seven feet stroke, give way to the new which have forty-five inch cylinders by five feet stroke. It is calculated that the new engines will perform about twenty-five per cent. more work than the old ones.

364,000 pounds of material have been put into the construction of the new engines, and 53,000 hours of labor have been expended upon them by the mechanics of the Pottsville shops during the past six months. This is exclusive of the immense amount of masonry required for the foundations, and also of the magnificent iron head-house built by the Phoenix Bridge Company.

In addition to the fact that the new engines are much more massive and better proportioned for their work than the old ones were, the principal improvements consists in the simplified method of transmission of the power from the engines to the ropes. By this means the wear and tear of the expensive steel ropes and also of the wooden drum blocks is expected to be so much reduced that a very material saving in the expense of operating the planes will result.

But a few remaining finishing touches are yet to be made, and by the first day of September next the coal tonnage over Mahanoy Planes will be in full operation again.

SPECIALTY IN COAL.

At Hopewell, Pa., the Cambria and Chevington mines of the Clearfield Consolidated Coal Company, under the general supervision of Mr. John Langdon, of Huntington, are running full time, employing 140 men. The seam worked averages four feet in thickness.

There has been a marked improvement in the coal shipments this summer from the Broadtop district.

Although there has been an increase of 300,000 tons of coal mined so far this year, in the Scranton, Pa., region, the number of accidents was not so large this year. This is due to the stringent mine law adopted at the last session of the legislature.

Trade is dull at the Chapman, Ohio, mines. The new coal company about to open the old Clark mine have purchased the property of the Youngstown Coal Company, and will operate on a large scale ere long.

The Kittanning Coal Company are opening up a new field of coal four miles back from Tipton, on the Pennsylvania Railroad, between Altoona and Tyrone. The Company has a seam showing four feet two inches of good coal.

The production of Bessemer steel ingots in the United States for the past six months of 1886 was 1,073,663 tons against 753,344 tons compared with the corresponding months of 1885; and of steel rails there were produced in 1886 707,447 tons compared with 452,446 in 1885. The *Iron Age* holds that it is impossible for American rail mills to produce the quantity allotted recently by the combination, viz., 1,568,000 net tons. The limit of production it puts at 1,500,000 net tons.

BOYCOTTERS ARRESTED.

THE BRICKLAYERS MUST ANSWER FOR CONSPIRACY.

NEW YORK, August 22.—As a result of their effectual boycotting of Brick-layer Michael Storen, who yesterday told his story to the District Attorney, twenty-four members of the Bricklayers' Union, No. 7, were today summoned to appear next Monday in court to answer complaints for conspiracy made against them by Storen. This is the case in which it was asserted that one of the boycotted men's children had died on account of privations suffered because the father, Storen, was unable to find any work, all the bosses being afraid to employ him.

Anthracite Output for September.

The allotment committee of the Anthracite coal companies met last Friday at 205 Broadway, New York. The committee consists of Frederica A. Potts, president of the New York, Susquehanna and Western railroad; Joseph S. Harris and E. B. Holton. These coal magnates met in secret session, and determined to limit the output of coal during September to 2,750,000 tons. During September last year, the output was 3,350,000 tons or 500,000 tons more than the amount fixed for the same month this year. This restriction of mining, it is believed, enables the companies to maintain their advanced rates for coal. Mr. Potts, however, explains the action of the committee in another way. He says the output for some time past has been largely in excess of the demand. The amount mined during the first three months of the year was 2,000,000 tons more than during the first quarter of last year.

An Important Matter Settled.

Restaurant keepers and their patrons will be interested in knowing when a person becomes legally bound to pay for a meal he has ordered. A judicial decision on that point is reported from New York, in the case of a couple of students who refused to accept the dinner they called for and refused to pay it. They were taken before a magistrate, who decided that as they had not cut the steaks set before them they were not bound to pay for them. To have tackled them with knife and fork would have consummated the contract between patrons and host.

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Harry R. Foster,

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A CHEAP AND EFFECTIVE MOTOR.

Bringing the Question of Motive Power to a Unique and Interesting Point.

We all noticed that the major has acted strangely of late, spending hours alone, plunged deeply into a tangle of mathematics, and going around with the air of abstraction peculiar to a man who has either incautiously swallowed an unripe melon or has something on his mind. Dick once tried delicately to gain the major's confidence by asking him what the devil he meant by such conduct, but the major smiled in a superior way and said we'd see one of these days, and then drew out Haswell's "Manual of Engineering" and spent four hours ciphering with logarithms. Yesterday morning, however, he came down to breakfast radiant and said he had it at last. Dick looked up in alarm and wanted to know whether it was small-pox or mumps, but the major replied that it was something scientific and useful, and so Dick need have no fear of catching it. This bit of Oriental repartee was calculated to settle Dick, but Dick looked grave and said he had told everyone that he knew the major wasn't permanently insane, and asked him to unfold the scheme at once and let us in on the ground floor if there was money in it. The major said there was money in it, and millions, and that after breakfast he would like to have Dick or anyone find a flaw in it.

Well, after breakfast, we all went to a secluded nook in the grove, and there, after satisfying himself that the old lady who was asleep in the hammock was not really eavesdropping, the major imparted to us his secret. He said the most important requirement of the human race in this mechanical century was a cheap and effective motor, capable of doing such light work in every household as sawing wood, rocking the baby, grinding sewing-machines and coffee, pumping water, running elevators, and so forth. Labor-saving machinery is an essential to civilization, and if we all had to work sixteen hours a day to accomplish what a fair steam engine can turn out in four minutes, we would soon drift back into the ignorance and gloom of the dark ages. Here the major paused, and Dick said that was a good exordium, and that if the major's scheme was to peddle razor strops and give free lectures, he thought it would be a go. The major ignored this sally, and went on to say that it was all very well to place reliance on steam exclusively, but steam required coal, and Prof. Agassiz has demonstrated the fact that at the present rate of consumption the coal beds of the entire world will be exhausted in 9,700 years, and then where will we be? This crushing argument was leveled squarely at Dick, and Dick thought it over backward and forward and remarked that he always felt there was something wrong, and was glad to know exactly what; that he didn't know where we would all be in 9,700 years, but felt reasonably sure, if certain accepted theories were true, that the major would be where he wouldn't have to bother himself about coal. Upon this the major arose in a dignified manner and remarked that it was very easy for persons of a flip-pant and ribald nature to joke at the expense of science, but the time would come when—at this juncture Dick apologized, and said he didn't mean to interrupt, but that somehow he hadn't as yet taken much interest in affairs 9,700 years hence, but would try, for it was every man's duty to provide for the future and not fool around from day to day. This mollified the major, and he sat down again and resumed. The whole fabric of political economy he said, rested upon power as applied by man to the arts and industries. To compel a man to earn subsistence by his muscle is to condemn him to poverty and humiliation. (Here Dick wanted to know if John L. Sullivan was an example of this—but the major frowned.) To give a man machinery capable of doing the same labor leaves him free to cultivate his brain, invent telegraphs, telescopes, drag poker, and other scientific embellishments of modern civilization. Yes, the major said, mechanical power is the foundation of human prosperity and advancement, and the crying need of the hour is, as he had remarked, a cheap motor within reach of persons of modest means, adapted to the household and capable of saving labor in domestic directions.

Of course we realized from this that the major had made a startling invention, and were proud of him. Even Dick braced up and tried to look scientific as the major continued.

Looking at the question practically he says we have only three motors at present from which to choose—the windmill, the steam engine, and the Keely motor. The wind-mill is too unreliable. Suppose a man depended upon a windmill to run his house? Why, during a blizzard it would do a week's housekeeping in seven minutes, and in the dog-days would take a week to grind two spoonfuls of coffee. The steam engine, of course, is reliable, but costs money, raises the insurance, requires an engineer, and is apt at any moment to provoke a coroner's inquest. The major said he bought a steam engine once for \$200, and on the third day of its work on the farm it blew up and killed a red-headed servant-girl and nine pigs, all of which were a total loss. He believed in the Keely motor and knew that it was thoroughly practical, with one single exception—it wouldn't work. The major portion of Keely's mistake lies in attempting to

derive power from a violin bow, but Dick said a bow properly handled has enormous power. Once he took lessons on the fiddle in an amateur way, and in less than a week developed so much power that the neighborhood was almost depopulated.

So we see, continued the major, that with all her discoveries and improvements science has not yet supplied us with a motor adapted to home wants, and that every requirement now proposes to fill. The true principle of scientific economy, said the major, is not to discover new forces, but to invent new means for utilizing forces lying idle around us. We utilize the horse, the mule, and the ox, for example, and turn their stored-up powers into sawed wood, plowed fields, and buggy-rides, but, although this experience pointed the right path, our advance ceases with the employment of these animals, and we now cry for new and costly motors, or even demand that Niagara's thunders shall be hushed that we may use her power, when the true solution of the problem was riot in every household in the land. The true answer, said the major, is the cheapest and most reliable industrious of domestic animals, and hitherto has been allowed to go to waste. Of course the mouse's individual power is limited, but so is that of one drop of water converted into steam, but large numbers may be simultaneously employed. An active and painstaking mouse can easily, upon a cat or other emergency arising, transfer himself through a distance of 12 feet in a second, or 120 feet in a minute, 7,800 feet in an hour. A mouse weighs, say, one-twelfth of a pound, or as much as an ounce of gold, although he hasn't the same value. Both these facts being true, it is clear that the liberated energy of a well scared mouse is equivalent to hoisting one-twelfth of a pound 7,800 feet in one hour, or 7,800 pounds one inch an hour. Twelve mice can lift, therefore, 7,800 pounds one foot in the same time, and a gross of mice, multiplies this result by 12, which is considerably in excess of the power of a horse. A good horse cost, say, \$200. A pair of mice costs nothing, and one pair is all a man will need, for by the time he has set up the machinery he will find he has a gross on hand, and after that the supply will be, if anything, in excess of the demand.

The utilize the new latent energy of the domestic mouse, the major says, was a mechanical problem which cost him many hours of labor and ingenuity, but he has solved it so as to meet both the requirements of utility and economy. The motor consists simply of a wire treadmill placed in a suitable dark closet and connected by belts or gearing to the machinery outside. Entrances to the treadmill are fitted nicely to gnawed thoroughfares leading to the haunts of the mice. To start the motor it is only necessary to insert a small piece of roasted cheese in a cage just outside the treadmill and half way up the circumference. Mice will immediately arrive and work with amazing enthusiasm to get that cheese, thus revolving the mill, which then does the labor required. A careful study of mice, says the major, has convinced him that their athletic employment in a treadmill, seemingly voluntary, will appeal to them as being a sort of gymnastic amusement, possibly remunerative with toasted cheese at any minute; and, not perceiving that it is really useful labor, will enter upon the race with reckless enthusiasm and be totally indifferent to fatigue. New arrivals of fresh mice will occur from time to time, and these will stimulate the workers to more vigorous spurts, lest the last comers carry off the coveted honors, and thus between their rivalry and their appetite, the major says, the mice will make things hum. Of course, after several hours' hard labor a mouse will be compelled through sheer exhaustion to knock off for a spell and take a nap, but, always believing he is the best mouse in the gang, will resume the race as soon as he has caught his breath and work harder than ever. If a reverse motion is ever required it will only be necessary to shift the cheese by a suitable lever. The major said the entire apparatus, exclusive of the mice, will not cost over \$14. As mice work with more zeal during the night, he proposes to attach an air-compressor to the treadmill, which will store up power in a wrought-iron tank, to be used at any time, and thus, although the habits of the mice may be irregular, the action of the motor proper will be constant and reliable. Furthermore, the major says, a vast increase in power can be obtained at trifling increase of cost—a three-hundred mouse-power treadmill costing but 64 cents more than one accommodating but thirty-six mice, and requiring only one ounce more cheese, while the rule will multiply themselves as fast as the wear and tear will necessitate. By this simple contrivance, concluded the major, not only would the burden of household cares be vastly lightened and machinery become practicable in every home, but there would be a vast moral and physical improvement in the condition of the domestic mouse itself, which would then abandon its now profligate and destructive career and become a laborious and deserving member of society. Having thus formulated the principles of his invention, the major received our congratulations and asked us if we could suggest any improvement; said that ingenious laymen sometimes gave really useful hints to scientific investigators, and he would cheerfully consider any proposition, however crude. None of us had any idea to offer, but Dick said that he thought he saw how an extra kink or two might be inserted. The major smiled a little superciliously, but Dick went on to say that if he had the motor in contemplation, he'd make it buzz. The major smiled again, and wanted to know how, Dick said he'd have a second treadmill under the

first, and insert about a dozen cats, and he'd lay they'd make the mice buckle down to work; and under the cat mill he'd have a third, loaded with active terriers, who would go for the cats and sort of stimulate them to put in their best ticks, and when the dogs got lazy he'd build a fire under them and wake them up. By connecting all three mills to the same shaft, Dick says he'd get nineteen times the amount of power without being compelled to resort to such a low artifice as cheese. The machine might be a trifle noisy, Dick says, but he will bet a new hat it would compress more air and devilmint in five minutes than a small family could use in a week.

The major says Dick's idea, although rough and somewhat complicated, has its good points, and is well worth the price of a caveat. He is convinced there is quite as much value in the invention as in the Keely motor, and will apply for thirty-seven patents early next week. Meanwhile, we are in search of a capitalist to back the thing up, and Dick says if the fool-killer doesn't come around for several weeks he has no doubt of our success.—*Cor. New York Times.*

Women as Inventors.

A correspondent of the Providence *Journal* claims that not one per cent. of the hundreds of thousands of patents issued annually in the United States is granted to women. There is not, he says, a single model of an important invention by a woman on exhibition at the Patent Office. Such as there are very small and simply devices of no particular importance. Of the articles used by women, such as corsets, glove fasteners, sewing machines, pins, needles, churns, shoe buttons, fans, fruit jars, button presses, piano, and other musical instruments, machine holders, patterns, and the thousand and other articles made for the fair sex, 99 per cent. are the inventions of men. In answer to inquiries the correspondent was able to find only a coffee pot, a fire escape, an artificial fruit compound, and a method of cutting paper patterns as accredited to the fair sex among recent inventions.

This looks bad for the inventive faculty of women. But it must be remembered—

First. That the inventive faculty is something that needs to be stimulated by adequate rewards. Until recently woman's sphere of action has been so circumscribed that she has not had half a chance either to put her ideas into practice or to reap the pecuniary results of her efforts. A woman in the machine shop, or engine room, or rolling mill, is considered so entirely out of place that she fears ridicule and wisely flees from it.

Second. It is no conclusive argument against her that of articles used by women the great majority of them are the inventions of men. To our knowledge some of the processes of manufacture used exclusively by men are inventions of women. Nay more, some of the most valuable inventions in certain branches of manufacture come from women in entirely different callings.

Third. That women not only can invent but can possess the inventive faculty to a very high degree, is shown in the case of Madame DeLong, who has lately introduced into England her metal-cutting machinery which has for some time been successful use in France. She has now it appears, perfected some ingenious machinery, worked by steam power, which cuts with the utmost precision the hardest and softest metal of any design, so that by it can be produced a gold lace pin or a steel castle port filling.

Thus far woman has not had a fair position in the race. Give her a chance, and then mark the results a generation from now.

The Bureau of Labor.

Commissioner Wright, of the United States Bureau of Labor, has the eighteen agents of the department hard at work collecting information for the second annual report of the Bureau, which he proposes to issue by the time Congress meets again. Commissioner Wright took charge of the Bureau, it will be remembered, in January, 1885, right in the middle of the fiscal year, and thus his first annual report could not be issued until this spring. In order to bring it into line with the other annual reports of the Governmental offices he proposes to get out his second annual report this fall. It will treat of two subjects: First, the strikes in the United States from 1880 until July 1st, 1886; the causes, duration, characteristics and results. Second, Convict labor in the United States, with its relation to the free labor of the country. Congress, at its last session, by resolution specially instructed the Commissioner of Labor to collect and collate information on this subject. No special agents will be sent abroad by the Bureau this year, though some information will probably be collected as to the prison system of Europe through correspondence. Congress gave Commissioner Wright \$92,810 for the work of the Bureau during the present fiscal year.

The contractor who carves out the western tunnel on the Georgia Pacific Railroad, "made a ten strike." He receives, of course, the usual pay for "dynamiting" the great orifices through earth and stone, but he had not gone twenty feet into the mountain side till he struck a seam of Bituminous coal eight and one-half feet thick. He will take out enough coal to pay thrice the cost of his work, perhaps, and yet receive compensation for stone and earth excavation through the whole length of the great tunnel.

CHECK WEIGHMAN AND SCALES.

The Supreme Court of Illinois Decides that Mine Operators can Manage their Own Business Affairs.

The widespread interest taken in this subject matter, must be our excuse for taking so much space. Below is the decision of the Supreme Court of Illinois (Hon. Judge Scholfeld delivering the opinion) in which it is held that a statute providing for the weighing of coal at the mines, requiring the owners and operators of the mines to provide scales, and weigh all coal taken out, and make such weight the basis of wages, is unconstitutional.

The defendant was indicted and convicted of failing, as the agent of the owner of a certain coal mine, to cause to be furnished and placed upon the railroad track, adjacent to the coal mines, a track scale of standard measure, upon which to weigh the coal hoisted from the mine, as provided by section 1 of "An act to provide for the weighing of the coal at the mine," approved June 14, 1883, and the several sections to amend sections 2, 3, and 4 of that act, approved June 29, 1885.

We held in *Jones v. People*, 110 Ill. 590, that it was competent to show, in defense of a person indicted under the same action, before the approval of the mandators act of June 29, 1885, that at the time the act took effect, and long prior thereto, the corporation in that case owning and operating the coal mine had a contract with all the men employed to mine coal in that mine, during the period to receive as the wages for their labor from said coal company, the sum of 40 cents per box for each box of coal mined and taken from said mine; that all the persons employed in the mine to mine coal for said company had always been and were then perfectly satisfied to work under said contract; and that they did not want the coal taken from the mine weighed as a basis upon which to compute their wages, etc. It was, in considering this question, among other things, then said: "Although section 2 does provide that the weight determined by weighing on the scales furnished shall be considered the basis upon which the wages of persons mining coal shall be computed, we do not regard this as requiring in all contracts for the mining of coal that the wages of the miners must be computed upon the basis of the weight of the coal mined. That would be a quite arbitrary provision—seemingly an undue interference with men's rights of making contracts—and we cannot ascribe to the legislature the making of such an enactment unless it be plainly declared, which is not due in this case."

The second section of the mandatory act, approved June 29, 1885, requires that all coal produced in this state shall be weighed on the scales, as provided in section 1 of the act approved June 14, 1883, and that a correct record of the same shall be kept in a well-bound book furnished by the owner, agent or operator of such mine for that purpose, by a competent person, at the expense of such owner, agent or operator; said record to be subjected to the inspection (at all reasonable business hours) of the miner, operator, carrier, land-owner, adjacent land-owner, member of the bureau of labor statistics, mine inspectors, and all others interested.

Section 3 provides that it shall be lawful for the miners employed in any coal mine or colliery in this state to furnish a check-weigher at their own expense, whose duty it shall be to balance said scales, and see that the coal is properly weighed, and keep a correct account of the same, and for this purpose he shall have access at all times to the beam box of said scales while such weighing is being performed.

The fourth section provides that a fine, or fine and imprisonment, as prescribed, shall be enforced on any owner or agent operating a coal mine failing to comply with these provisions. Another section provides that all contracts for the mining of coal in which the weighing of the coal, as provided for in that act, shall be dispensed with, shall be null and void.

The court, at the instance of the people, instructed the jury that since the first day of July, 1885, the law prohibits the making of any contracts between the operators of the coal mines and the miners in which the weighing of coal, as provided by law, is sought to be avoided, and the court refused to instruct the jury that "if they believed from the evidence that the company for which the defendant is working does not sell nor offer to sell coal by weight at its mine at which defendant is employed, and that it has contracts with all the men employed in its mine to mine coal at 25 or 20 cents per box, then the jury should find the defendant not guilty." There was evidence before the jury on which to predicate this instruction.

The question is thus presented whether it is competent for the General Assembly to single out owners and operators of coal mines as a distinct class, and provide that they shall bear burdens not imposed on other owners of property or employers of laborers, and prohibit them from making contracts which it is competent for other owners of property or employers of laborers to make.

It is declared in section 2, article 2, of our Constitution, that "no person shall be deprived of life, liberty or property without due process of law." And section 13 of the same article provides that private property shall not be taken or damaged for public use without just compensation. The words "due process of law" in this connection are held to be synonymous with the words, "the law of the land" (Cooley Const. Lim. [1st ed.] pp. 352, 353), and this means general public law, binding upon all the members of the community, under all circumstances, and not partial or private laws affecting the rights of private individuals or classes of individuals. *Jones v. Reynolds* 2 Tex. 251. See also *Wynehamer v. People*, 15 N. Y. 432; *Vanzon v. Waddell*, 2 Yerg. 299. "Every one," says Cooley (Const. Lim. [1st ed. p. 351], "has a right to demand that he be governed by general rules; and a special statute that singles his case out as one to be regulated by a different law from that which is applied in all similar cases would not be legitimate legislation, but an arbitrary mandate, unrecognized in free government. Mr. Locke has said of those who make the laws: 'They are to govern by promulgated, established laws, not to be varied to particular cases, but to have one rule for rich and poor, for the favorite at court and the countryman at plough; and this may justly be said to have become a maxim in the law by which may be tested the authority and binding force of legislative enactments.'"

And again the same authority says (p. 393): "The doubt might also arise whether a regulation made for any class of citizens, entirely arbitrary in its character, and restricting their rights, privileges or legal capacities in a manner before unknown to the law, could be sustained. Distinctions in these respects should be based upon some reason which renders them important—like the want of capacity in infants and insane persons; but if the Legislature should undertake to provide that persons following some specified lawful trade or employment should not have capacity to make contracts or to receive conveyances, or to build such houses as others were allowed to erect, or in any other way to make such use of their property as was permissible to others, it can scarcely be doubted that the act would transcend the due bounds of legislative power, even if it did not come in conflict with express constitutional provisions. The man or the class forbidden the acquisition or enjoyment of property in the manner permitted to the community at large would be deprived of liberty in particulars of primary importance to his or their pursuits of happiness."

We held also in *Enders v. State*, 8 Hunph. 583, where the sections of the act incorporating the Union Bank, which provided that if any of the officers, agents or servants of that bank should embezzle the funds of the bank, or make false entries, they should be guilty of felony was held unconstitutional, because it did not apply generally to officers, agents or servants of banks committing like offenses; and *Wally's Heirs v. Kennedy*, 2 Yerg. 554, where an act authorizing the court to dismiss Indian reservation cases, where prosecuted for the use of another, was held unconstitutional. In the last case the court said: "The rights of every individual must stand or fall by the same rule of law that governs every other member of the body politic or land under similar circumstances; and every partial or private law which directly proposes to destroy or affect individual rights, or does the same thing by affording remedies leading to similar consequences, is unconstitutional and void. Were it otherwise, odious individuals or corporate bodies would be governed by one law, the mass of the community, and those who made the law, by another; whereas a like general law, affecting the whole community equally, could not have been passed."

On like principles also is *People v. Marx*, 99 N. Y. 377; S. C. 52 Am. Rep. 34.

It is in no condition or situation of the laborers in the mine to disqualify him from contracting in regard to the price of his labor, or in regard to the mode of ascertaining the price? And why should the owner of the mine, or agent in control of the mine, not be allowed to contract in respect to matters as to which all other property owners and agents may contract?

Undoubtedly if these sections fall within the police power, they may be maintained on that ground; but it is quite obvious that they do not. Their requirements have no tendency to insure the personal safety of the miner, or to protect his property or the property of others. They do not meet Dwarrit's definition of police regulations. They do not have reference to the comfort, the safety or the welfare of society. Potter Dwar. Stat. 458.

In *Austin v. Murray*, 16 Pick. 121, it is said: "The law will not allow the rights of property to be invaded under the guise of police regulation for the promotion of health, when it is manifest that such is not the object and purpose of the regulation." See also like effect the language of Colt, J., in *Watertown v. Mayo* 109 Mass 315; S. C. 12 Am. Rep. 634, and the opinions of the court, and cases referred to, in *Le Application of Jacobs*, 98 N. Y. 109, et seq.; S. C. 50 Am. Rep. 635, and *People v. Marx supra*.

But it is suggested in argument that one purpose of the section is to furnish needful information to the public. If that be so, then under section 13, article 2, *supra*, there must first be made compensation to the owner of the property thus to be devoted to public use; for it must be too apparent to need argument in its support that to compel the purchasing of scales and the employing of a person to use them, for the benefit of the public, is to appropriate the private property, i. e., the money which this will cost, to public use. *Morse v. Stocker*, 1 Allen, 150; *Sale v. Glen*, 7 Jones (Law), 321.

The main reliance of the counsel representing the state to sustain the ruling below seems however to be on the ground that mining for coal is affected with a public use, so that it may be regulated by law, like public warehouses, as held in *Munn v. Illinois*, 94, U. S. 113. It cannot be claimed that mining for coal was by common law affected with a public use, and therefore specially regulated by law, like the business of inn-keepers, common carriers, millers, etc.; and in our opinion it is not, like the business of public warehousing, within the principle controlling such classes of business. The public are not compelled to resort to the owners of wood or turf, or even to the owner of grain, domestic animals, or to those owning any of the other necessities or conveniences of life which form a part of the commerce of the country.

The owner of a coal mine is under no obligation to obtain a license from any public authority, and therefore when he chooses to mine his coal he exercises no franchise. We are aware of no case where in it has been held that the owner or operator of a coal mine stands on a different footing, as respects the control and sale of his property, than the owner or operator of any other kind of property in general demand by the public. We are not unmindful that our Constitution, in section 29, article 4, enjoins legislation in the interest of miners; but this is solely as respects his personal safety—the enactment of police regulations to promote that end. It recognizes that the business is dangerous to life and health, but it nowhere intimates that there is anything in it which disqualifies parties engaged in it from contracting as they may in regard to other matters, or that gives the public a use in it. There is also in section 5, article 13, a provision requiring railroad companies to permit connection to be made with their tracks, so that coal banks or coal yards may be reached; but the same provision also applies to consignees of grain, and it affects the duty of the carrier alone, for no duty or obligation is enjoined on the owner of the coal bank or coal yard in that respect.

We recognize fully the right of the General Assembly, subject to the paramount authority of Congress, to prescribe weights and measures, and to enforce their cases, but we do not think that the General Assembly has power to deny to persons in one kind of business the privilege to contract for labor, and to sell their products, without regard to weight, while at the same time allowing to persons in all other kinds of business this privilege; there being nothing in the business itself to distinguish it in this respect from any other kind of business.

And we deny that the burden can be imposed on any corporation or individual, not acting under a license, or by virtue of a franchise, of having property and hiring labor merely to furnish public statistics, unless upon due compensation to be made therefor.

So far as the owner or operator of a mine shall contract for the mining of coal or the selling of coal by weight, we see no objection to the statute as imposing upon him the duty of procuring scales for that purpose; but we do not think that he can be compelled to make all his contracts in these respects to be regulated by weight; and when he has no necessity for the use of scales in these respects, he cannot, in our opinion be compelled to keep and use them.

We think the court erred in its ruling in giving the one and refusing the other instruction. The judgment is reversed, and the cause remanded for further proceeding consistent with this opinion.

Mining Machinery.

Meech & Company, Cleveland, manufacturers of mining machinery, have just made a shipment of 200,000 pounds, being a full 50-ton capacity, to Chihuahua, Mexico. Another shipment of like capacity is now loading for Lower California, to be shipped via San Francisco. One plant of like capacity has been contracted for to be shipped to New Mexico, two to Colorado, one to North Carolina, one to Zacatecas, Mexico, and one plant of 100 tons daily capacity, roughing about 400,000 pounds to Chihuahua, Mexico, and more than a score under negotiation.

Last week there was shipped from the Jeaneville (Pa.) Iron Works of J. C. Haydon & Co., a complete mining plant for the antimony mines of Sevier county, Arkansas. It consists of two pair of hoisting engines, with cast iron grooved drums; also one engine of 40-horse power to drive crushers, fans, &c.; five boilers, steel wire rope for two shafts, fans for ventilating, buckets, and all the mining appliances which these works know so well how to build. These antimony mines have been very well proven the last year by William F. Roberts, Jr., lately of Hazleton, Pa. Large purchases of land have been made, a metallurgical works will be constructed at the new town near by, a railroad is in progress of building, and thus step by step in this as in many other enterprises, the capitalist, the miners and mechanics of our grand old commonwealth of Pennsylvania help the whole Union to develop her mineral wealth.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

FIRE IN A MINE.

The Largest Colliery in the World Narrowly Escapes Destruction—1200 Men Thrown Idle.

About daylight on Friday morning, Aug. 27th, smoke and flames were seen issuing from the bottom of the Nottingham shaft in Plymouth, Luzerne Co., Pa. A short time thereafter the alarm of fire was given and before the breakfast hour had arrived more than a thousand miners, with their wives and children had arrived at the scene. It was at once observed that the fire was in the interior of the mine, working its way along the gangways, and as yet a considerable distance from the shaft. Willing hands were set at work to subdue the fire, working faithfully all day and all night until three o'clock yesterday morning, when the word went forth that the fire was out, and thereupon the workers sought a well earned rest.

But the fire was not out. It smouldered during the forenoon, and about 11 o'clock Saturday morning burst forth with renewed energy. This was all the more startling because of the feeling of security which previous assurances had given. The company's officers at once took measures to combat the flames. Three gangs of sixty men each were engaged. Each of these gangs was furnished with a long line of hose and an ample supply of water. They took turns at the work, each gang remaining at the facing less than five minutes and then retiring in an exhausted condition to the manway for air. In this way the flames were fought until after 4 o'clock yesterday afternoon, when success seemed to have crowned the efforts of the gallant firemen, and all hands were withdrawn from the mine in the firm belief that everything was secure.

The one exciting incident of the fire was the narrow escape from death of William Smith, of Wilkes-Barre, the general superintendent of the company's mines, and Reese Morgan, a boss at No. 11 mine of the same company. Both men went into the mine and venturing too far were overcome by the heat and sulphur and were brought to the surface unconscious. They revived in a few minutes and are now perfectly well. Yet they realize that they had a very narrow escape from a horrible death.

The Nottingham mine is one of the largest in the world. The people of Plymouth, practical miners, who have seen many mines in this and other countries, claim that it is the very largest, and that it has never had an equal. It is owned and operated by the Lehigh and Wilkes-Barre Coal Company. Its ramifications under ground extend many miles in various directions from the foot of the shaft, one gateway going westward toward the mountain, another toward the river, and about three hundred yards distant therefrom, there are, as in most mines, three seams, one beneath the other, all of which are now being worked. To show the great capacity of the mine it is only necessary to point to the fact that there were hoisted to the surface one day last week, in eight hours, 1,301 loaded cars, each car containing nearly three tons of coal. When put to its full capacity the miners say a loaded car passes up every fifteen seconds, and averages under ordinary operations is over three cars a minute.

The general superintendent of the mine, as previously stated, is William Smith. The inside superintendent is Morgan R. Morgan, and the outside superintendent George Conner. A clerk in answer to questions said the fire was now out and the men were engaged in pumping the water from the mine. He could not tell the extent of damage done, but thought it would not be great. He said there were about twelve hundred men and boys employed in the mine, and believed they would be thrown out of employment for some weeks.

Richard McClure, one of the most intelligent miners employed at the Nottingham, said he had just come from the mine after fighting the fire, with scores of other men, for several hours. The fire occurred, he said, in the third lift, about three hundred yards from the foot of the shaft. It will take a month or six weeks to straighten up the six lifts which have been damaged, but in the meantime the rest of the mine can be worked. The pump was smashed to pieces, and there is great danger in going in and out, as the roof is falling down and liable to crush a man without warning.

How the fire originated is somewhat of a mystery. The only theory advanced thus far is as follows: Timbers caved down on Wednesday for the week. Consequently there was no one inside at the time the fire broke out. It is said that Morgan Hughes, the fireman at the pump house, was at a picnic on Thursday and at an early hour Friday morning went in to fix his fires. He laid his lamp near a prop and the lamp set fire to a lot of waste saturated with oil, which was stored in the vicinity. From this the props and other timbers caught fire, but fortunately the coal was not ignited. Hughes escaped by means of a ladder to the upper opening, and thence to the shaft half an hour before the fire was discovered. Since then, it is said, he has not been seen. The loss to the company is estimated at \$20,000.

SUBSTITUTES FOR STEAM.

Compressed Air Regarded as the Most Serviceable and Also Economical.

At the recent Spring session of the American Society of Mechanical Engineers, at Chicago, one of the most interesting papers presented was that by Mr. George H. Babcock, of New York, on "Substitutes for Steam."

Mr. Babcock gave a brief history of many attempts to work engines by using some other fluid than steam, and said none of them had proved successful except air and gas engines for lighter powers. After describing the many attempts in detail and their failure, he reached the conclusion that a successful substitute for steam in motive power cannot be found among vapours, and most probably, if found at all, it must be among permanent gases. By a bountiful provision of nature, an equally free and exhaustless supply of a perfect gas—atmospheric air—has been provided, which has several elements of value in the problem. As it requires 500 degs. of heat to double its pressure at 39 degs. Fahr.—the point of greatest density of water—it may be heated to a very high temperature before it reaches a practical limit of pressure. It is a poor conductor of heat and does not condense when cooled; therefore, it will suffer less loss from being used in a cool cylinder. Being a supporter of combustion, the fuel may be burned within the working fluid, and the loss due to the furnaces avoided. It also offers the opportunity of recovering a larger share of its rejected heat to be used again. In a steam engine the only use to which this rejected heat can be put is in heating the feed-water and air for combustion, and only a small fraction—not over one-sixth—can be utilized in that way, while with air Rankine estimates that as much as 90 per cent. of the heat in the exhaust may be retained for use, by a device invented by Stirling, known as the "economizer" or "regenerator." There are disadvantages, however, peculiar to air, among which are its bulk and the necessity of initiating motion by external power. The former is overcome by compression before heating, and the latter may yet be provided for in some simple manner. Air, then, gives the best promise for an economical substitute for steam in pressure engines. The development of its advantages involves many difficulties, but these are fast being overcome. The air engine of Stirling of forty years ago, equalled in economy any steam engine of its day, while the Shaw engine, of 1867, equalled in economy of fuel the largest and most perfect steam engines of to-day. Gas engines exhibit an economy of heat double that of our first-class steam engines, but they are handicapped by the necessity of using a very expensive fuel, and are necessarily confined to small powers and special circumstances. The prospect of much further economy in steam engines is not bright. By means of a non-conducting lining for the cylinder, a saving might be effected of, say 2 per cent. in fuel, bringing the efficiency up to 13 or 14 per cent. and by tuning the pressure up to 25 lb. we might attain, possibly an efficiency of 17 per cent., or the same as is now attained in gas engines. Are there still further possibilities of economical development of power? Probably not in the line of pressure engines. But science already points to the possible conversion of heat directly into electricity, and if that can be done without too great a loss the electrical engine may yet become a prominent rival of the steam or air engine. The conversion of 90 per cent. of electrical energy into mechanical work is not beyond reasonable expectations, even if it is beyond present attainment, and if the heat of combustion can be converted into electricity with a loss of only 10 per cent.—which is supposable—we then should get a horse power of .22 of a pound of coal per hour. This would be a saving of 30 per cent. over the best probable results with air engines, or 85 per cent. over the best results yet attained with steam. Is steam, therefore, doomed to be superseded? By no means. Even if robbed of its position on the throne of power, it must ever remain one of the most useful servants of man. Its large specific and latent heat renders it the best attainable medium of transferring heat within a certain range of temperature, from the furnace to the place where it may be wanted for various processes, and even now it fills a larger field in that direction than it does as a prime mover. So far as now appears, it need fear no successful substitute in that field.

Copies of the New Mine Law.

We had printed a large number of both the new Anthracite and Bituminous mine laws of this State for sale at this office, but we found the demand for them so large that both have already been completely exhausted. We therefore printed another and larger edition of each of the laws mentioned for those who desire them. They have been carefully read and compared with certified copies from the Governor. The price per copy of either the Anthracite or Bituminous law is only 10 cents. Not a single miner in the State can afford to be without the law affecting the region in which he resides.

Pittsburg.

From the American Manufacturer.

The "barge" rise noted in our report of last week permitted the shipment of only about a million and a half bushels, and not more than half of this reached market, owing to a sudden subsidence of the Ohio. Quite a number of empty craft came in on the rise, but a great many were caught on the way by the low water, and will have to wait for a freshet. A considerable number of "barges" and "boats" are still loaded at the mines. There were not enough towboats to tow the former and not enough water to float the latter. They will have to wait till the next sufficient swell of the water. Mining is going on with considerable briskness in the Third and Fourth pools, but in the First and Second but little work is being done. Prices remain as follows:

PRICES AT PITTSBURG.

River, wholesale, on board..... $3\frac{1}{2}$ to $4\frac{1}{2}$ cts. per bushel.
Railroad..... $4\frac{1}{2}$ to $4\frac{3}{4}$ cts. per bushel.

AT CINCINNATI.

River, wholesale, on board..... $5\frac{1}{2}$ to $6\frac{1}{2}$ cts. per bushel.

AT LOUISVILLE.

River, wholesale, on board..... $4\frac{1}{2}$ to $4\frac{3}{4}$ cts. per bushel.

AT NEW ORLEANS.

River, wholesale, on board..... 25 to $26\frac{1}{2}$ cts. per bbl.

Bushels are rated among dealers here at 76 lb.—26½ bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke—Production and consumption continue as large as ever. Prices for September will be the same as they have been in August and the several preceding months, as follows: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Wise Words.

Our labor troubles are of altogether different and more serious nature than the scare-crow of anarchy. That the race should live for a few men is not tolerable from our point of view, and our destiny compels us to strive and bring about a social condition in which all men shall live for every man. Now the lot of the laborer is not here or anywhere what we know and feel it might be and ought to be. The laborers, who in proportion as their minds have been awakened have become conscious of the hardships and limitations to which they are subject, feel this more keenly than any other class, and hence they have formed innumerable organizations to protect their rights and promote their interests. It is utterly futile to make an outcry against these trades unions and combinations of unions. They exist, and the ends for which they exist, spite of incidental abuses connected with their working, are praiseworthy, and there is no power which can put them down.—Bishop Spalding, R. C., Peoria, Ind.

No Place for Poor Men.

A number of prospectors have returned to Juneau, from the lower coast of Alaska, having been unable to obtain employment. Not having the means to support themselves they are seeking transportation to more hospitable shores. The *Alaskan*, published at Juneau, says: No man should come to this country without the means to sustain himself for some time. There is work here to do, and a good deal of it, but there is no great demand for labor, outside of that which is employed. The companies and individuals doing business are generally supplied with all the help they need, and in most cases have supernumeraries from whom to draw their extra labor when required. Prospecting is laborious and expensive, and a man should come with a sure situation, or the means to invest in something that will pay.

The coals of the No. XII, or Lower coal measures in the Virginias, have now been proven, by a number of years of experience, to be the equals of any of the coals of this country for the manufacture of the very best of cokes for all purposes. The coke made from these coals on New River, commands a higher price at Louisville, where they come into competition, than does the "typical Connellsville" coke; and coke from the same coals did eleven per cent. more smelting work at Low Moor, Va., blast furnace than did the same quantity of Connellsville coke in the blast furnace of the North Chicago Rolling Mill Company. Of the coke made at Pocahontas, from the "Pocahontas" bed coal, in a letter in *Bradstreet's*, Dr. Thomas M. Brown says: "The coking properties of this coal are all that could be desired. A ten month trial of this coke at Crozer furnace, at Roanoke, Va., gave results fully equal to those previously obtained with Connellsville coke, which is considered the most perfect blast furnace fuel."

SAFETY LAMPS FREE.

Every mine boss should possess a good safety lamp, even if the mine does not give off fire-damp. There is no telling when it will make its appearance, and a safety lamp may be wanted at any moment for purposes of investigation. Any person sending us five new yearly subscriptions for this paper, at the same time, can have Williams' improved safety lamp or the Boss' pocket safety lamp sent free.



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-AT-

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FOR THE WEEK ENDING

SATURDAY, SEPTEMBER 4, 1886.

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FALL TRADE PROSPECTS.

The indications of an unusually large and prosperous fall trade for 1886 not only continue encouraging, but as the time approaches become even more pronounced. The tendency during the summer months has been steadily in the direction of greater activity, the volume of business in nearly all branches of trade and industry increased regularly and gave promise of the most active fall trade of recent years. As opposed to these indications there were predictions of reaction and disaster by the croakers who demanded the suspension of silver coinage. Their predictions might have been verified had their wishes regarding the coinage been gratified, but they were not, and the rest of the people valued their advice at what it was worth.

The fall trade is now upon us and no more active industrial prosperity, no brighter outlook has been seen during the past several years. It is true that prices are not high. In fact the level to which they have been held during the past few months, while the volume of trade increased so rapidly, shows that there is not a wide margin for profit. But manufacturers and producers are hopeful of obtaining better prices in the future, and except in such cases as when the cost of production has been increased, are perfectly satisfied with the situation and prospects.

The Bulgarian situation disturbed things somewhat on both this and the other side of the Atlantic last week, although there was scanty reason for supposing that Great Britain would get into difficulty with any other power about Bulgaria. But there will always be people who are ready and willing to believe anything that looks plausible, and consequently prices of wheat, corn and oats were quickly advanced in the markets, following the overthrow of Alexander from the throne. Yet those who advanced wheat to 90 cents on the strength of Bulgarian news had to realize speedily or at a loss. The prices slowly dropped to 87 by the end of the week. Corn also declined about 1½ cents, and oats, lard, dressed hogs, butter and cheese also lost the advance they felt early in the week when speculation regarding the prospective war on the Bosphorus began.

Despite the predictions of the goldites, gold continues to come to America, notwithstanding the coinage of silver has not been suspended, and despite the fact that calls for bonds aggregating \$29,000,000 have been issued. This is no surprise to any but those who were frightened by the owl-like hooting of the wisecracks who predicted disaster in the event of Congress refusing to suspend silver coinage. The coming gold, however, gives confidence to this class, no matter how small they may be, and will continue to help as long as it continues to come. The redemption of the \$29,000,000 of 3 percents. will not pour a great quantity of money into the market, as it is now ascertained that nearly seven-eighths of the amount is held by the banks. Some of the banks are already buying 4 or 4½ per cent. bonds in anticipation of the present and future calls. They are preparing for future emergencies, and their actions indicate that a call for any amount would not surprise them. The remaining \$100,000,000 of this class of bonds now outstanding might be redeemed without prejudice to any interest and largely to the advantage of the public.

The railroads have made good reports of earnings during the past few months, and promise to increase them in the immediate future, unless the existing conditions should be disturbed by labor troubles resulting from a demand for higher wages. This is really the only disturbing element of the present or future. Labor disturbances still continue, and in spite of numerous adjustments, appear to increase in frequency. The Anthracite coal trade has shown perhaps more improvement during the past month than any other branch of business. This, however, is due to the fact that up to August 1 the trade was in a badly demoralized condition and to the heroic treatment resorted to by the coal combination. The restriction of the August output to 2,500,000 tons had a salutary effect and the fixing of the September yield at 2,750,000 tons enabled the operators to obtain a slight advance in prices. The market is now stronger than for some time past, and dealers are hopeful respecting results during the next few months. Orders are more plentiful, and the attitude of the dealers toward prices is reflected in the announcement of another slight advance. A largely attended meeting of producers was held in New York on Tuesday

when prices were advanced as follows: Stove, egg and chestnut 15 cents per ton each, and grate 10 cents. The report at the meeting was that all the companies maintained the advance made at the previous meeting, the stock of coal being greatly reduced in the meantime. The average price of coal for the first seven months of 1886, according to the figures obtained by the Lackawanna coal company, is but \$2.86, as compared with \$3.67, for like period of last year. It will be seen, therefore, that the large quantity of coal mined and shipped in the early half of the year has been put upon the market at a sacrifice, and it will also be seen that even the two advances recently made will not bring prices up to the average obtained last year. The total shipments of Anthracite from January 1st to July 31st were 16,956,924 tons; the August allotment was 2,500,000 and the September allotment is 2,750,000 tons, making the total shipments to October 1st, 22,206,924 tons. This would leave 11,293,076 tons to be shipped in the last three months of the year to produce the 33,500,000 tons which it was predicted at the beginning of the year would be marketed in 1886. It is not likely, however, that the market will demand more than 10,000,000 during the last quarter of the year, or that more than this could be marketed at the figures now obtaining. This would bring the year's output up to 32,250,000 tons, the largest ever mined, and give steady employment to the producers during the next three months.

The iron manufacturing establishments in the South are utilizing to some extent, the culm that has been accumulating in the coal region for some time past. Scientific men and engineers have lately asserted, that the time is not far distant when all the waste or screenings about coal mines will be profitably used in some manner. It is certain that the prospect is very cheering in this direction. The owners of the immense pits of culm throughout the Anthracite coal fields of Pennsylvania may yet find a prompt and good paying market for the refuse whose disposition has puzzled them for many years. There has been a time when the deposits have been diminished by patent coal makers, but these schemes had but a temporary existence.

A SYNDICATE of prominent capitalists has purchased an extensive tract of land in Southwest Virginia and will commence mining operations in the early future. The territory controlled is said to be highly prolific with coal, iron and other valuable minerals. Within a recent period the mountain country of the southwestern part of the Old Dominion State has come to the front as a fine and productive mining region. Experts, who have made investigations, claim that the undeveloped mineral deposits are remarkable for their variety, extent and fineness. Mineralogists, in the employ of Eastern mining and manufacturing companies, are engaged in extensive explorations, and the outside world will soon be made acquainted with the result of their researches.

The fight between the English iron masters and their continental rivals is increasing in interest. The *Colliery Guardian* now has it that English makers "have convinced the world that girders made in the north of England are not only vastly superior in quality to those of Belgium, but they are also equal to them in dimensions and in every other characteristic upon which the Belgian makers pride themselves; while in price, at five shillings more, the English article is greatly cheaper than the Belgian." Thus the industrial war rages. The conditions thereof are being reported with increasing minuteness. But now England is threatened with an invasion of Belgian coal. The *Colliery Guardian* makes merry over it all, while holding that England is invincible both at forge and coal-pit.

THE meeting of coal managers held at New York on Tuesday at the office of Frederick A. Potts was very largely attended. After a long discussion it was decided to advance stove, egg and chestnut coal 15 cents per ton and grate 10 cents. The meeting then adjourned until November 14th. The condition of the coal trade at present was said by President Potts to be very good. All the companies have maintained the advance made at the last meeting and the stock of coal on hand has been greatly reduced. The present convention of coal producers he considered the most satisfactory one ever held,

WISCONSIN is trying to compete with Ohio and Pennsylvania in finding coal oil and natural gas, but so far is a long way behind.

THE cost of strikes to the workmen during the last year is computed at \$13,000,000. And it was money thrown away beyond recovery.

AERIAL navigation seems in a fair way to be successfully accomplished by a French aeronaut. The Democratic party is watching the experiment with interest.

IT is believed that stove coal in New York harbor can shortly be pushed up to \$1 per ton, and eventually to \$4.25. These will be good prices, but we do not regard the basis of the prediction as sound.

THERE will be no advance of coal prices in September by either the Lehigh or Schuylkill coal exchanges, nor will railroad tolls be augmented. The August advances are to be given a full test, before going farther.

THERE are many alleged extortions practiced by grasping and unscrupulous coal dealers in the large cities, but the men who sell Anthracite fuel by installments are perhaps the most scheming and rascally operators. Of course there are some installment dealers who transact a really legitimate and honest coal business, but three-fourths of those people trade upon very questionable principles, and it would be well for the consumers to refuse to purchase from the installment dealer and buy their coal supplies from men who sell for cash, the latter method being the only fair one after all on which to transact business of any kind.

DURING the last week of October the Northern-born citizens of North Carolina propose holding a convention and mass meeting, and at the same time make an exposition of agricultural products grown by them, manufactured articles, and other goods. There will also be an exhibition of the minerals and precious stones mined in that State. The call for the meeting is signed already by over one thousand Northern citizens. This gathering will show the part Northern people are taking in the development of the State. They will issue an invitation to all their friends North to be present at the meeting. Low rates will be given to those who desire to attend. The display of products, manufactured articles and minerals is expected to be very fine and attractive.

A formidable combination has been organized in Eastern Ohio and Western Pennsylvania to fight the introduction of coal cutting machines. It is understood that a number of wealthy and influential mine owners and operators have formed a powerful association for the introduction of the patented machinery, and a complete revolution in coal production will be witnessed some time towards the close of the year. From all the intelligence that can be gleaned upon this important and interesting matter, it is fair to predict that serious, even disastrous, complications, must ensue unless there are concessions made upon the side of both employers and employees. Further developments will be watched with deep interest by all parties in any way connected with the coal trade.

Mr. A. P. Laurie, in a paper before the Chemical Society on "The Electro-Motive Force Developed during the Combination of Cadmium and Iodine in Presence of Water," says he has determined, by means of a Thomson electrometer, the electro-motive forces of cells consisting of a cadmium and a platinum immersed in solution of cadmium iodide containing free iodine. In one set of experiments, the amount of cadmium iodide in solution was constant and the amount of iodine was varied; in another, the amount of cadmium iodide varied, the solution being in each case saturated with iodine; in a third a constant amount of iodine, but varying amounts of cadmium iodide, were used. The result of the experiments is to show that, if cadmium and water containing cadmium iodide and free iodine are brought together, a considerable electro-motive force is developed, which steadily falls. This depends on the facts (1) that as the free iodine is diminished, the electro-motive force falls gradually at first, but more rapidly the less iodine there is present; (2) that as the cadmium iodide solution increases in strength, the electro-motive force falls very rapidly while very small quantities of the salt are present, but more and more slowly as the amount of salt present becomes considerable. In both cases, the change may be represented by a continuous curve. The actual values are given in the paper.

A SAD CALAMITY.

An Explosion in a Scranton Mine Hurls Five Men to Death.

At Fairlawn colliery, near Scranton, Pa., on Monday five men were hurried without a moment's warning into the dread beyond. The deadly gas had done its work once more in running up the ghastly record of fatalities that mark the disemboweling of earth of its mineral wealth. The sad catastrophe occurred in this wise: The low rumble of an explosion of gas was heard about 8 o'clock, and the concussion was terrific. Rocks were blown up the slope and cast high into the air. The guides of the plane, 800 feet above the explosion, were broken by the concussion. Those in the vicinity of the mine at once understood what had happened, and in a half hour a crowd numbering fully three thousand people had assembled, men swarming out of the works in the vicinity to ascertain, if possible, the extent of the disaster. This was impracticable, however, as no one seemed to know how many men were in the mine, or how many were injured. The first rumor stated that forty men had gone down and thus it was feared all had perished. This produced intense excitement, those who had cause to think they had relatives in the mine crowding about the mouth of the slope, eagerly asking particulars from below. It was an idle day at the mine, hence only company men were below and as soon as inquiries were made it was seen that there could not be many of them. The rumor that there were forty men under ground was pronounced untrue and it was shouted that seventeen men were below and that most of them had perished.

Mine Inspector Blewitt arrived promptly and the work of rescue commenced. It was found upon examination that terrific as the explosion had been it had not stopped the fan. This led to the belief that the fatality had occurred in the middle vein. The officials about the mine said that three veins were worked, the Clark or upper vein, the middle and lower vein. As the middle vein is not connected with the fan, which is kept running, it was seen that this must be the scene of the explosion.

Later a clerk of the company after a short investigation announced that only seven men were in the vein in which the explosion occurred. There were six or seven others in the Clark vein who escaped without injury. This report, though had enough, was so much better than the preceding one that great relief was experienced. Still, old and middle aged women crowded about the slope and their heartrending cries of grief made many strong men turn away and wipe their eyes.

At 8:30, after a weary hour of waiting, several miners crawled out of the slope and announced that they had not been able to penetrate into the vein far enough to find the men, the gas driving them back to the foot when they attempted it. Mine Inspector Blewitt made his appearance a half hour later. He was weary from over exertion and his face was a ghastly pallor. While he was being assisted home he managed to articulate that there were seven men in the mine and that all were not dead.

This gave hope to those who had relations below, for it had been learned by this time that the seven were John Kerrigan, Patrick Connor, John Niven, Ed. Gaughan, Ed. Pierce, the fire boss, Michael Proll and Hugh Connors. Speculation as to who were living out of the seven caused the excitement to be renewed, and as soon as the announcement was made that the rescuing party had fought their way through the gas to the injured men, it required Chief Wade, Officer Jordan and Poole, assisted by several specials, to keep back the crowd from pressing so closely about the mouth of the shaft as to prevent the air from entering.

The first man brought to the surface was John Niven, who boarded with a gentleman named Crane in the Thirteenth ward. He was carried into a small shanty and at once attended to by Dr. Pier and Father Coffey, both of whom had been summoned after the explosion. He was badly burned and cut about the face. After a short examination Dr. Pier, who had been joined by Dr. Lynott, announced that the chances of his recovery were of the best and the man was removed to the hospital. A few minutes later four men came up the slope bearing the remains of John Kerrigan. He was living when found in the mines but when examined by the physician, he was pronounced dead. The grief of his relatives, who had assembled, was terrible. The young man was married and his home was in Petersburg, where the remains were taken.

A quarter of an hour later another man was brought to the surface. He was not so badly injured as Nebill and it was stated that he was in good condition. It was quite difficult to recognize him, but inquiry proved him to be Patrick Connor, a married man living in the Nineteenth ward.

The others were dead, having been fearfully burned. The remains were removed to the surface and as soon as possible were driven home. The killed were as follows: John Kerrigan, aged 35 years, married and living in Petersburg; Hugh Connors, aged 45 years, married, with five children and living on Luzerne street, Bellevue; Edward

Gaughan, aged 45 years, married, with eight children, living on Capouse avenue, Pine Brook; Michael Pryle, aged 45 years, married, without children, living on Luzerne street, Bellevue; Edward Pierce, the fire boss, of whom, in the excitement, few particulars were learned.

The remains of Pierce were not recovered until 12:30. When the explosion occurred it is likely he was distant from the others and his body was hurled still further away. Five of the men were found grouped close together. The manner in which the most were mutilated, showed how terrific had been the explosion.

The work of rescue was most difficult, and those who braved the dangers of the gas are entitled to more than mere credit. That was a kindling of heroism which exceeded in lustre the bravery of the soldier who bravely faces death in the ranks of battle.

Connor, who is about 21 years of age, was injured least of all, and told how the accident occurred. He said six were walking along close together, with Pierce in advance, when the mine boss set off the gas. The explosion was terrific, and he remembered little after.

The Mineral Statistics.

The mineral statistics for the year 1885 have just been issued, and give, as usual, a great deal of useful information. On another page we present a summary of the mineral production of last year, which may be usefully supplemented here by allusions to some of the other leading figures of the year. The total number of persons employed in and about the mines of Great Britain and Ireland was 561,676, of which number 520,632 were under the Coal Mines Regulation Act and 41,044 under the Metalliferous Mines Regulation Act. The production of coal last year was 159,351,418 tons, which sold for an average of 5s. 2d. per ton as compared with 160,757,779 tons and 5s. 5d. per ton in 1884. The quantity of copper ore raised was 32,241 tons, and of copper precipitate 138 tons, making a total of 36,379 tons, valued at £30,912, as against 42,149 tons and £12,613 in 1884. Our exports of copper (British and metallic copper from imported foreign ores) was 60,759 tons, whilst of foreign copper we exported 9,408 tons and 27,609 worth of manufactures. Of iron ore and ironstone the production was 15,417,982 tons, yielding 5,353,524 tons of metal and valued at £23,963,719, compared with 16,137,857 tons of ore, at 5,626,444 tons of metal and £4,463,275 in 1884. Last year we imported 3,313,488 tons of iron ore, against 3,153,133 tons in 1884. There were 892 blast furnaces in existence, 434 being in blast, yielding 7,415,469 tons of pig iron, using 17,937,966 tons of iron ore, and 15,257,527 tons of coal.—London Ironmonger.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Aug. 28, 1886.

	Week.	Year.
	Tons.	Tons
Shipped South.....	38,568-12	1,362,968-18
Shipped South.....	38,393-07	1,754,202-46
Total.....	76,961-19	3,117,171-04
For corresponding time last year.....	58,255-92	1,316,719-93
Shipped South.....	68,799-06	1,535,455-19
Shipped South.....		127,054-08
Total.....		2,852,175-02
Increase.....	50,929-09	261,996-02
Decrease.....		

There seems to be a probability at last that the old and trite saying of "carrying coals to Newcastle" is about to be invested with a considerable amount of truth. There is a scheme now on foot, and, strange to say, backed up by a syndicate of English capitalists, to so improve the canal facilities between the Interior of Belgium and the Scheldt as to greatly facilitate the shipment of the smokeless Belgian coal to London. The proposed plan includes the erection at Brussels of enormous coal docks and wharves, with every facility for cheap handling. The cheapness of this coal and of pit labor in Belgium renders this scheme not only feasible, but highly remunerative. The demand for the coal, which has been introduced in considerable quantities, is greatly on the increase, and will be practically unlimited. The advantage to the atmosphere of the city of London by the use of this fuel will be enormous, and before long it may really become possible for the average "cockney" to know what sunshine actually is. Meanwhile, what between his own labor troubles and the Belgian competition, the life of the British colliery owner is truly not a happy one.

IMPORTANT.

When you visit or leave New York City save Baggage, Express and 83 Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot.

613 Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best. Horse cars, stages and elevated railroad all at depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city. 23-1y

Up to date 12,000 diamonds have been found in the recent drifts in the Bengera, Inverell and Cudgung districts of New South Wales. The principal minerals associated with the diamonds are gold, garnets, wood-tin, brookite, magnetite, ruby, apatite, topaz and quartz. The largest diamond yet found weighed 16.2 grains, or 5.5 carats.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided.

All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Supplies the Area.

Editor Mining Herald and Colliery Engineer.

SIR:—I send you solution of question given by H. Drifton, August 2d viz.: A square airway (I suppose) 25 feet area, 300 yards long, passes 2,150 cubic feet of air per minute, what should be the area of another square airway to pass the same quantity 400 yards long, all other things being the same? (I suppose the same pressure.)

First, let us find what will the air course produce in the 400 yards length of airway. We find it 1863 feet. Now, the question assumes this shape: An airway 25 feet area, 400 yards long, produces 1863 cubic feet of air per minute, what will be area of a square airway to produce 2150 feet? I showed some time ago, through the MINING HERALD, the formula, to solve these questions, (or the velocity in the unknown airway, is proportional to the 5th root of the quantities of air), which will give in this case 76.68 feet velocity, and area of airway 28.0386 feet.

Yours, &c.,

A. STINNER.

Wilkesburg, Allegheny Co., Pa., Aug. 25, 1883.

A Boy's Queries.

Editor Mining Herald and Colliery Engineer:

SIR:—Please answer the following questions.

1. What is the reason that men get headache, giddiness, &c., when working where air does not travel?

2. What is meant by the term "volume?"

Respectfully Yours,

THE BOY.

Kalnda, Pa., July 24, 1886.

Accepts the Correction.

Editor Mining Herald and Colliery Engineer:

SIR:—In your issue of Aug. 18, "Learner" of Hollywood, corrects an error in one of my problems. I beg to thank "Learner," and only wish others would follow his example. Your readers are doubtless aware how easily errors will occur in such work. "Learner's" result is correct but the formula he refers to is

$$\sqrt{\frac{64}{7854}} \times 3.1416 \times 3,000$$

and not

$$\frac{\sqrt{64}}{7854} \times 3.1416 \times 3,000$$

as stated in his correction. Dividing the given area by 7854 gives a square whose side is equal to the diameter of a circle having an area of 64 feet, and the root is the side of such square, which equals the diameter. Then 3.1416 times the diameter is the circumference, which multiplied by the length gives the rubbing or internal surface of the tube.

Yours, &c.,

R. M.

Llewellyn, Pa., Aug. 30, 1886.

Mining Questions.

Editor Mining Herald and Colliery Engineer:

SIR:—In answer to your correspondent "J. R." (1.) What is a perimeter of an elliptical shaft the axes of which measure 16.6 feet and 12.8 feet?

One method of working this gives the perimeter 46.18152 ft., e. g.,

$$\frac{16.6 + 12.8}{2} \times 3.1416,$$

but as the perimeter of an elliptical shaft is more in proportion to its diameters than a circular shaft, the following mode of working gives a more correct answer:

$$\sqrt{\frac{16.6^2 + 12.8^2}{2}} \times \frac{16.6 + 12.8}{2} = 46.3736 \text{ ft.}$$

Yours, &c.,

GOMER.

Nanticoke, Pa., Aug. 24, 1886.

Editor Mining Herald and Colliery Engineer:

SIR:—In reply to "A. C. S." I send the following answers to third and fourth questions.

(1.) A shaft 250 yards deep makes 150 gallons per minute; what power would be required, and what size of pumps?

$$\frac{250 \times 3 \times 150 \times 10}{33000 \times .66} = 51.6 \text{ horse power.}$$

I have reckoned two-thirds for friction, &c. Also to obtain the size of pumps I will suppose 6 ft. stroke and 5 strokes per minute; therefore

$$\sqrt{\frac{150}{.034 \times 6 \times 5}} = \sqrt{147.0588} = 12.12 \text{ inches}$$

diameter of pump required.

(2.) If ten men can clear a drift 20 yards long, 6 ft. wide, 4 ft. deep in seven days, at ten hours a day, how many days will it take fourteen men, working eight hours a day to clear 50 yards of a drift 8 ft. wide and 5 ft. deep?

$$\left\{ \begin{array}{l} 14 : 10 :: 7 \\ 20 : 50 \\ 6 : 8 \\ 4 : 5 \\ 8 : 10 \end{array} \right\} = 26\frac{1}{4} \text{ days to do the work; or}$$

$$\frac{10 \times 50 \times 8 \times 5 \times 10 \times 7}{14 \times 20 \times 6 \times 4 \times 8} = 26\frac{1}{4} \text{ days to do the work.}$$

Yours, &c.,

Drifton, Pa., Aug. 23, 1886.

SOLVER.

Editor Mining Herald and Colliery Engineer.

SIR:—In answer to "A. C. S." whose questions appeared in the MINING HERALD for Aug. 21, I send the following. There must, however, be a mistake with regard to the diameter of cylinder in first question, and I take it for granted that 20 in. and not feet was meant. It is also necessary to suggest a speed.

Question 1.—High pressure engine.—Diameter of cylinder 20 in., then

$$20 \times 20 \times .7854 = 314.1600 \text{ area.}$$

Then 40 lb. pressure less $\frac{1}{10}$ for friction = 39.666 effective service. The 314.1600 \times 39.666 = 12461.4705600 \times 150 (speed of piston) 1869220.5840000 \div 33,000 = 56.636351 horse power.

Ques. 2.—Engine power required for 1,000 tons per day, from a shaft 600 feet deep.

First, suppose four tubs at $\frac{1}{4}$ cwt. of coal in each tub, giving the full load of tubs and coal at 62 cwt. Then, 62 \times 112 \times 6,944, equal full load. Again, 6,944 \times 1,800 ft. = 12,499,200 \div 33,000 = 378 horse power. Again, power engine, &c. Two 28 in. cylinders will be ample size for the above service; 28 \times 28 \times .7854 = 615.8536 \times 2 = 1231.7072 area of the two cylinders. Then 1231.7072 \times 35 lb. pressure = 43109.7520 \times 320 ft. (speed) = 13795120.6400 \div 33,000 = 415 horse power. (P. S.—Drum would require to be 13 ft. diameter.

Yours, &c.,

Latrobe, Pa., Aug. 24, 1886.

MAXIM.

Philadelphia.

Ledger:—The anthracite coal trade continues to improve gradually, though at present, owing to the smallness of the output of coal during the past two months as compared with the corresponding period of last year, the movement of coal is not very great. The markets, however, continue to absorb all the newly mined coal forwarded, and tidewater stocks are being drawn upon to help fill orders for shipment Eastward and to Sound ports. On Saturday the Reading Company's total stock of all sizes of anthracite at Port Richmond was reduced to 71,000 tons, for part of which vessels were in waiting to load for the East. The proportions of the various sizes of coal in stock at that point on the day named were: Broken, 1000 tons; egg, 14,000 tons; stove, 38,000 tons; chestnut, 16,000 tons, and pea, 1000 tons. The Lehigh Valley Railroad and Lehigh Coal and Navigation Company both report their coal business as satisfactory, with a promising outlook for the remainder of this season. It is generally believed by the trade that the demand for all sizes of anthracite coal within the next three months will be fully equal to the supply. On Saturday it was rather difficult for wholesale dealers in anthracite to obtain prices for coal for shipment, on and after September 1st. This was partly owing to the non-action of the transportation companies in fixing the tolls on coal from Mauch Chunk and Schuylkill Haven to tidewater shipping points last week. Another meeting of the representatives of the coal carrying companies will be held this week to discuss further the same question. It is understood that, as the rate of toll on coal for local consumption is already high enough, no advance will be made on shipments for the line and city trade, but that there may be an advance in the tolls to New York harbor and vicinity is not unlikely. Should the tolls be advanced to those points the rates charged for carrying coal will probably not exceed the figures ruled before the reductions made last year. As already announced, the Lehigh and Schuylkill Coal Exchanges met last week and decided not to advance the prices of coal for September delivery. There will no doubt be a general stiffening in the actual selling prices for anthracite after the first or second week in the coming month, and a very close approach to the full circular prices for coal for shipment beyond the Capes of the Delaware and from Elizabethport to-day. The committee of the Schuylkill Coal Exchange has notified coal operators shipping via the Philadelphia and Reading Railroad that all shipments of coal from the Schuylkill region will be discontinued after to-day (Monday), August 30th, until Wednesday morning, September 1st, the percentage of the August quota of

that region having been filled.

The Receivers of the Reading Coal and Iron Company have issued the new circular fixing coal prices for September. The following are the line and city trade prices: Schuylkill white ash, at Schuylkill Haven—Lump, steamboat, broken and egg, \$2.60; stove and small stove, \$2.85; chestnut, \$2.60; pea No. 1, \$1.25; buckwheat, 75 cents. Schuylkill red ash, at Schuylkill Haven—Egg, \$2.75; stove and small stove, \$3; chestnut, \$2.75; pea No. 1, \$1.25. Shamokin white ash, at Schuylkill Haven—Egg, \$2.60; stove and small stove, \$2.85; chestnut, \$2.60; pea No. 1, \$1.25. Shamokin red ash, at Schuylkill Haven—Egg, \$2.85; stove and small stove, \$3.15; chestnut, \$2.75; pea No. 1, \$1.25. Lorberly red ash, at Pine Grove—Egg, \$2.85; stove and small stove, \$3.15; chestnut, \$2.65; pea No. 1, \$1.25. North Franklin white ash, at Schuylkill Haven—Egg, stove and small stove, \$2.85; chestnut, \$2.60; pea No. 1, \$1.25. Lykens Valley red ash, at Schuylkill Haven via canal—Broken, \$3.10; egg, stove and small stove, \$3.60; chestnut, \$2.85; pea No. 1, \$1.85; pea No. 2, \$1.30. Lykens Valley red ash, at Pine Grove via rail—Broken, \$3; egg, stove and small stove, \$3.50; chestnut, \$2.75; pea No. 1, \$1.75; pea No. 2, \$1.20.

Vessel freights continue about as heretofore quoted, the full minimum rate of the National Association being obtained. Owing to the scarcity of coal at this point a number of schooners are reported to have left for New York, from whence Anthracite shipments are said to be increasing, and for Norfolk, where they can command readily cargoes of Pocahontas soft coal.

The total amount of Anthracite coal sent to market for the week ending August 21, as reported by the carrying companies, was 649,072 tons, compared with 700,464 tons in the corresponding week last year, a decrease of 51,392 tons. The total amount of Anthracite mined thus far in the year 1886 is 18,901,854 tons, compared with 17,506,811 tons for the same period of last year, an increase of 1,401,023 tons. The following statement gives the gross tonnage of each of the leading coal carrying companies for the week ending August 21, and for the year to same date, compared with the respective amounts carried to the same date last year:

Week	1886	1885	Difference
Reading R. R.	220,525	8,836,835	8,241,069
Lehigh Valley	122,120	4,416,244	4,029,123
D. L. and Western	104,593	3,040,209	2,725,120
Shamokin	13,840	533,579	590,844
End R. R.	37,623	1,013,833	1,039,586
Penn. Canal	32,179	358,571	77,514
Del. and Hudson	79,534	2,511,636	2,176,507
Lehigh	1,234	1,027,673	1,026,439
Clelland	42,807	1,296,270	1,840,749
Hun and B. Top.	13,945	482,669	391,619
Nor. and Wtn.	12,080	522,062	360,964

The Pennsylvania Railroad reports that the quantity of coal and coke carried over its lines for the week ending August 21 was 278,820 tons, of which 211,738 tons were coal and 63,020 tons coke. Of the weekly tonnage 199,824 tons originated on the main line of the Pennsylvania Railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 9,426,365 tons, of which 7,282,016 tons were coal and 2,144,349, coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading Railroad reports that its coal shipments for the last week, ending August 28, was 239,000 tons, of which 35,000 tons were sent to and 39,000 tons shipped from Port Richmond, and 27,000 tons were sent to and 25,000 tons shipped from Elizabethport. Vessels are in plentiful supply at Port Richmond, and freights are quoted at 1.05 and discharge to Boston, at 90c, and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 85¢@90c, and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending August 21 were 71,372 tons, and for the year to that date 1,330,120 tons, a decrease of 381,813 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio Railroad and local points—Week, 54,911 tons; year, 1,041,284 tons; decrease, 222,774 tons. To Pennsylvania Railroad—Week, 208,424 tons; year, 169,692 tons; decrease, 92,772 tons. To Chesapeake and Ohio Canal—Week, 12,417 tons; year, 119,144 tons; decrease, 80,617 tons.

While a gentleman, says an electrical exchange, was watching some spiders, it occurred to him to try what effect a fork would have on the insects. He suspected that they would regard the sound just as they were in the habit of regarding the sound made by a fly. And, sure enough, they did. He selected a large, ugly spider that had been feasting on flies for two months. The spider was at one edge of its web. Sounding the fork, he touched a thread at the other side of the web, and watched the result. Mr. Spider had the buzzing sound conveyed to him over his telephone wires; but how was he to know on which particular wire the sound was traveling? He ran to the center of the web very quickly, and all around until he touched the thread at the other end of which the fork was sounding; then taking another thread along, just as a man would take an extra piece of rope, he ran out to the fork and sprang upon it. Then he retreated a little way and looked at the fork. He was puzzled. He had expected to find a buzzing fly. He got on the fork again and danced with delight. He had caught the sound of the fly, and it was music to him.

LABOR AND SOCIETY.

The Duties and Privileges of Each and How They Should Be Discharged.

The following article from the pen of Prof. W. G. Sumner appears in the September number of *The Forum*:

Any one who has attentively read the discussion of the so-called labor question during the past few months must have observed that a strict definition of terms and phrases is the first thing needed in the discussion, and the one thing that has been most wanting. The loose use of terms tolerated by the economists has been extended by the newspapers, adopted erroneously by the preachers, abused by the professional labor reformers, and finally entirely misunderstood by the employed, until the popular notion of the matter has become little else than a tangle of fallacies and misconceptions of social facts, relations, and possibilities. He who says "social," nowadays, takes license to promulgate vague and whimsical notions or projects, having for their general aim to bridge the traditional gulf between *meum* and *tuum*, or to take from one of his neighbors and give to another, according to his good judgment of what would be more "just." As an illustration of misuse of terms I mention the use of "capital and labor" to designate employer and employee, and as an illustration of the abuse of catch phrases I refer to the almost suicidal misuse of "an injury to one is an injury to all" in the southwestern strike.

The only attempt I have met with, in this discussion to define what the labor question is, formulated it in this way: "With the growth of democracy the political power has passed into the hands of a numerical majority, while property is in the hands of a minority. There is, therefore, danger lest the former use the political power to plunder the latter, unless the latter coöperate the former by timely concessions." If this were the question, it would, no doubt, be serious enough. It would certainly look to the labor question as the safeguard of liberty and property under democracy, more than they were under older political systems; but that they are still only convenient means for those who can control the institutions to violate liberty and property to their own advantage. It would mean that all our boasted political progress was in question, for institutions that can not guarantee property can not be stable. Democracy would either have to yield at once to communism, as the only realization of its own principles, or it would be overthrown by a monarchical reaction to secure property. Furthermore, if the question were as stated, it would be a question arising among the property classes, and would be suggested by them for their interests; it would not be a question arising among the employed, and bearing on their struggle for their interests. The question would therefore be a political question and a property question. It would not be a labor question.

If I attempt, out of the vague, sentimental, and declamatory expressions of the parties interested and their friends to formulate the question they try to raise, it seems to me to be this: How can those who have neither land or capital, and who are excluded from the ownership of the society as wage workers, get their living or get a better one, for more than they now get out of the stock of goods in society, for the productive effort which they put into the work of society? The socialists answer this question by saying that a committee should be appointed to apportion the work of society, and that the goods should be distributed according to standards which each school of socialists would have defined, but upon which no two schools are agreed. The professional socialists say that some more "just" distribution ought to be found, that supply and demand will not do, and that "ethics" must be asked to decide. The press, the pulpit, the law, the university, all claim the power that the wage class, by virtue of numbers, has in the lawless, and eagerly ready to flatter and cajole it by any proposal or proposition that will please it.

Is the question above stated properly raised, or properly forced upon public attention? I venture to maintain that it is not. The question how we shall get our living, or how we shall get the best possible living, is common to all of us, but that insignificant minority which has inherited land or capital enough to support a family without work. The question is no more anxious or perplexing to artisans of handi craftsman than it is to the mass of the farmers, lawyers, doctors, clergymen, teachers, bookkeepers, merchants, editors, etc., or to the aged, invalids, women, and others who depend upon small investments. It is constantly alleged in vague and declamatory terms that artisans and unskilled laborers are in distress and misery, or are under oppression. No facts to sustain these assertions are offered. The cause is not a social evil, or a social wrong. The cause is not a social burden. The problem how that part of society is to earn its living is not a public question. It is not a class question. The question how to earn one's living, or the best living possible in one's circumstances, is the most distinctly individual question that can be raised. A great deal might be done, by instruction and exhortation, to inform the individual mind and con-

science, especially of parents, so that this question might be more wisely solved than it now is. Such would be a legitimate field for discussion, and the social consequences of foresight and early self-denial, such as are now employed by the best parents and young people among us, would be incalculable; but no public question can properly be raised as to how some shall make it easier for others to get a living, when the first are already fully burdened with the task of getting a living for themselves. Here, as at every other point in any unbiased attempt to deal with this subject, it is found that the real question is whether we shall maintain or abandon liberty with responsibility.

It is sometimes said to be a shocking doctrine that the employee enters into a contract to dispose of his energies, because this would put him on the same plane with commodities. This objection has been current among the German professional socialists for years, and it has recently been made much of here by those who catch eagerly at the sentimental aspects of this subject. Every man who earns his living uses up his vital energy. He may till his own land and live on his own product, or he may raise a product and contract it away in exchange for what he wants, or he may contract away his time, or his productive energies, or "himself," for the moment, to another man, for his maintenance. In the first case there is no social relation at all. In the last two cases, no distinction can be made affecting the dignity of the interests of the man which is anything more than dialectical refinement. The lawyer, doctor, clergyman, teacher, editor, etc., each makes a commodity of himself just as much as the handi-craftsman does. Each is "exploited" just as much by those who pay as the handi-craftsman is. We men have a way of inflating ourselves with big words on this earth as if we thus gained dignity, or were any less bound down to toil or suffering. If wages were abolished, or if the social system were altered, the social basis of the earth would be altered. Men would be worn out in maintaining their existence, and the only question would be just what it is now: Can each one get more maintenance for a given expenditure of himself by living in isolation, or by joining other men in mutual services?

The wages system, then, is part of the industrial organization. An American farmer is his own landlord, tenant and laborer. If he finds it hard to get a living, he has no employer against whom he can strike. He may curse the ground, or shake his fist in the face of heaven, but that will not help him. He must either work harder, or cut down his enjoyments to the measure of his production. If, however, the three interests are separated in a higher organization of society—if the farmer makes a contract by which he yields the use of his land to another, and himself becomes a landlord, and if the new tenant employs a laborer then the personal rights and interests of three men come into play, and each is bound upon each other at every change which before would have affected different interests of the same person. The first farmer could not as employee strike against himself as employer, but the three new parties have antagonistic interests, which must be adjusted and readjusted from time to time by some force or other. If, then, we regard the economic forces of supply and demand as the only, the proper, and the inevitable regulators of the complex and highly-refined interests that arise between the members of a highly organized society, then "justice" can mean nothing but the unrestricted play of supply and demand. Nobody will be bound to cease grumbling at the result, but each will accept it as the best that he could get in a world of toil and disappointment. He will be satisfied that his neighbors are as well off as he is, if, of course, he is not. We do not believe that there are any economic forces at work in the matter, or, if there are any, they work under any necessary laws, then we must regard the adjustment of interests as a product of arbitrary effort. There can then be no right and no justice at all. The only thing to be expected is war, industrial war, carried on by the parties in interest each for himself and to the utmost. Such is the only result to which we can come, and the socialists have generally reached it. There is no doubt that it is a clear issue between two schools of political economy which are diametrically opposed to each other. If there are economic laws, then it behooves us to find them out and submit to them, and we can establish peace, order, and justice only under them. If there are no economic laws, then war is the normal and the only possible condition of society, and we must take refuge under the peace deceptions of the socialistic state, with its verberation of volupriaries at the top and the stolid barbarism of its brutish masses at the bottom. To reject the economic laws, accept the condition of industrial law, and then look to "ethics" to rule the social tempest is beneath discussion.

An industrial war is not like a military combat. It is an extension of the old commercial war, which consisted in inflicting a positive harm on one's self in the hope of causing a contingent harm to one's enemy. It is at best like the schoolboy game known as "cutting jackets." The industrial war simply aims to see who can stand it longest. It is currently asserted that a man has a right to strike. That assertion involves one of the incorrect uses of the word "right," which are so common in this discussion. When a man "strikes," he exercises his will to liberty. Liberty that is to say, he exercises a prerogative for the sake of a negative liberty. He may make or unmake contracts. He is also at liberty under our institutions, as at present existing, to combine with others of the same interest and the same way of thinking. However, the other party

to the contract has the same liberty. Hence, when both employers and employees combine, the battle is set for the industrial war.

There is a form of strike that would not be irrational, and would be in accordance with sound political economy; that is, if the employees should all stop work, maintaining that the employer could not fill their places except on the terms demanded by them, and should put their contention to the test by waiting to see whether he could or not. A lock-out would be rational in the converse and corresponding case. It would then cost less of time to the parties interested, but nothing more to them, and nothing to anybody else. A strike, in which the employees take possession of the plant and hinder others from taking their places, is inconsistent with the peace and order of a modern civilization. A lock-out, if it is to be successful, must be employed, must inevitably be developed, must be elaborated in the effort to make it succeed. It could only produce anger and retaliation. It is an effort to coerce one of the parties to a bargain. Undoubtedly a man who has a bargain to make will do wisely to strengthen himself by all means in his power for the negotiation; but the man who pays wages parts with his capital, and, if he parts with it on terms to which he is coerced, he is wronged. He, in his turn, then, will defend his interests to the utmost.

The boycott is a further attempt to find a point of reaction for the coercive apparatus. The original cause of boycotting, from which the device got its name, was very generally approved, or at least not condemned, because it was set in operation against an Irish landlord. It was, however, plain in that case what the device was, and how monstrous an innovation it was in a civilized society. The boycott consists in cutting a man out of the organization of society. If a man can be so extruded from human society, without process of law, that he cannot buy or sell, beg, borrow, lend, employ, or be employed, what becomes of the security of life, liberty or property? Of course, no such result can be brought about unless the boycotters could bring terrorism to bear on the whole community, including, at last, judges, and justices to force people who are not judges, to the quarantining of their legal and peaceable enjoyment of their own will and pleasure to take part in the boycott. It is the severest trial to which our institutions have yet been put, to see whether they can protect in his rights a man who has incurred for any reason unpopularity among a considerable number of his neighbors, or whether democratic institutions are as powerless in this case as aristocratic institutions were when a man incurred the hostility of a great noble.

The doctrine that are preached about the relations of employer and employee would go to make that relationship one of status and not of contract, with the rights and duties unevenly divided. The relationship would then be one like marriage, entered by contract, but, when once entered upon, not solvable except by some process of divorce, and, while it lasts, having its rights and duties defined by law. It is very remarkable that just when all feudal relations between landlord and tenant are treated with disdain and eagerly assailed there should be an attempt to establish feudal relations between employer and employee. An employer has no obligation whatever to an employee outside of the contract, any more than a landlord has to his subscribers, or a merchant to his customers, or a free-owner to his tenants, or a banker to his depositors, or a free democratic state employes are not wards of the state. They are not like ludians or freedmen, or women, or children. If it can be shown that any law or custom of our society keeps down the man who is struggling for himself, every fair-minded man could and would join the agitation for its removal, but when we are asked to create privileges or tolerate encroachments, resistance is equally a social duty.

These extravagant and cruel measures, therefore, produce war inside of our society. Industrial factions arise, which are organized under monarchical or oligarchic forms, and which threaten to carry out their programme at all cost to the community. They are doomed to fail. They will not be overcome by conciliation and concession, because they are not animated by the spirit from which any concession will secure peace, but only larger demands. They will fail, because they will come into collision with the sober sense of the community. It is indeed a great experiment to grant the fullest liberty and the greatest political equality. In the faith that the unsuccessful will not only regard without envy the prosperity of the successful, but also will help to secure and defend it, but it is a fallacy in every point of view that, because those who have not outnumbered those who have, therefore those who have not will plunder those who have. Still more certainly, the measures that have been used to assist the employed class against the employers will fail, because they are irrational and at war with economic forces. There are many cases of sociology where the sum of parts is not a whole, but is zero. The trades-union is one of them. A national trades-union, or an international trades-union of all employees, instead of being invincible would be nil. If by going out to-day all could force an advance in wages by all going back to-morrow all would restore the old rate. The human race cannot lift itself by the boot straps in this way any more than in any other. If we want more wages the only way to get them is by working, not by not working.

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F. M. Co. Box 115, Newport, Ky.

SCIENTIFIC.

SOMETHING NEW AND VALUABLE IN GLASS MANUFACTURE.

Berlin papers copy from the *Germania* the account of an important discovery in glass manufacture made by Friedrich Siemens, of Dresden. He has succeeded in casting glass in the same way as metal is cast and obtaining an article corresponding to cast metal. This cast glass is hard, not dearer in production than cast-iron, and has the advantage of transparency, so that all flaws can be detected before it is applied to practical use. It will be much less exposed to injury from atmospheric influences than iron. The process of production is not difficult, the chief feature being rapid cooling. The hardness and resisting power of this cast glass are so great that experiments are just being carried out at the Siemens glass foundry at Dresden with the purpose of ascertaining whether the material could be employed for rails on railways.

VALUABLE SCIENTIFIC PUBLICATION.

The annual report of the Pennsylvania geological survey for 1885 is a handsome volume of nearly 800 pages. The report contains 5 folded plates, 13 page plates and 51 page and text cuts, and is accompanied by an atlas of 3 sheets of maps and sections. Some of the contained matter has already been printed in the *HERALD* from advance sheets, notably Prof. Lesquereux's theory on the vegetable origin of coal. The volume will be invaluable to all who are interested in the development of our state's great anthracite industry and we opine that it will not be long before the present edition is entirely exhausted.

DRINKING WATER.

It is a mistake to drink too much or too frequently in hot weather; the fluid taken in is very rapidly thrown out again through the skin in the form of perspiration, and the outflow being promoted by this determination toward the surface a new and increasing demand for fluid follows rapidly on the successive acts of drinking and perspiring, with the result that "thirst" is made worse by giving way to it. Meanwhile, it must not be forgotten that thirst is nature's call for fluid to replace that lost by cutaneous exudation in warm weather; and if the demand be not met what may be regarded as the residual fluid of the tissues must be absorbed or the blood will become unduly concentrated.

NEW DISINFECTANT.

In these hot summer days, when there is so much evaporation about buildings, the following will serve a good purpose: Take of nitrate of lead one heaped teaspoonful and dissolve in a quart of boiling water; then take four heaped teaspoonfuls of common table salt and dissolve it in a bucket nearly full of cold water; now add the quart of boiling water containing the nitrate of lead; mix up with a stick, and the article is complete. The purifier is useful to throw into cesspools, water-closets, decaying offensive substances creating a nuisance, to neutralize the effluvia from scarlet fever, diphtheria, typhoid and typhoid fevers, dysentery, small-pox and in fact, in all diseases of an infectious or contagious character. It is as clear as water, and can be sprinkled about the room and over the bed clothes occupied by persons laboring under infectious or contagious diseases. This disinfectant is equal if not superior to chlorides, bromo-chloralum, chlorides of lime and soda, and is free from any unpleasant odor. It is very cheap, costing only about two cents a bucketful; the nitrate of lead can be obtained at nearly every drug store, and the salt being in every house costs almost nothing.

NIAGARA'S RECESSION.

At a meeting of the American Association for the Advancement of Science in Buffalo, Professor R. S. Woodward, of Washington, read a paper on Monday on the rate of recession of Niagara Falls. He said that the area of rock worn away at Horseshoe Falls between the years 1842 and 1875 was 15,500 square feet, equal to 42.5 acres; between 1842 and 1886, 24,500 square feet, or 56.2 acres; between 1875 and 1886, 60,000 square feet, or 13.7 acres. The main length of the contour of the falls is 2300 feet. The time required to recede 1 mile, if the rate is 2.4 feet per year, is 2200 years.

CURRENT COMMENT.

WHAT IS GLEANED FROM FACTS AND OPINIONS ON INDUSTRY.

The first strike in this country occurred in New York city in 1803. A number of sailors struck for \$14 in place of \$10. They paraded the streets, but the leader was arrested and lodged in jail, which put an immediate end to the trouble.

There never was a time when the growth of wealth and of the selfish individualism which accompanies it corrupted so many poor people. Rich and poor are dominated by the same ideals, and dominated by the same fervid desires.—*Age of Steel.*

Rhode Island has at last decided to permit her volunteer soldiers of the war of 1861 born in foreign countries to vote. These men have patiently waited all these years for that state to redeem a pledge given them in their young manhood, when they enlisted as soldiers to battle for the union.

The bituminous coal markets of the north-west are in a very bad condition through a cut-throat game of competition that is now going on. Natural gas, electricity, coal oil and mining machinery are also playing a very important part in the demoralization of the soft coal trade.

Bob Ingersoll says: "As long as the laboring man follows the drum and the fife of a political party, just so long will he have plenty of grievances. The workingmen will find that without revenge and without riot the world can be made better and the capitalist will find that starvation prices for his men will finally starve him."

In the report of the state mine inspector of Kansas we find the following: The output of coal in 1884 was 27,000,000 bushels and for 1885 it was 30,000,000. During 1885 the miners employed numbered 3,597. In the beginning of 1884 there were 273 mines in the state. In January, 1886, there were less than 200. Although the number has fallen off the production has increased. Much dissatisfaction exists among the men in regard to the coal being screened before it is credited to them some claiming that they can do better at 2 1/2 cents per ton the year around and not have it screened than 3 1/2 cents screened.

OF INTEREST.

VENTURES AND FINDS OF MEN WHO MAKE OUR WEALTH.

The silver ore found at Abingdon, Mass., assays 11 per cent. silver.

Three distinct veins of good coal have been traced over a mile at Millville, Cal.

A Fort Worth concern has begun shipping 200 frozen beef carcasses a day to England.

An inventor proposes to manufacture car rails of paper. He claims for their durability, elasticity, noiselessness and many other advantages.

Coal has been discovered near Manhattan, Kansas, at a depth of 20 feet. The vein is said to be 10 inches in thickness.

St. Louis brewers declare that unless the boycott is lifted from one of their number by September 4 they will discharge all union men in their employ.

The Parsons (Kansas) Coal Co. have struck a new 4-foot vein of coal at a depth of 80 feet, on a tract of land recently purchased by them between Weir City and Cherokee.

Heinrich Stein, a young German engineer, is anxious to make a high and dry bridge connection between Europe and America. He proposes to hang a cable from one side of the Atlantic to the other, and to suspend from this traveling cars.

General Secretary Turner, of the Knights of Labor, meets with difficulty in finding a Richmond hall large enough to seat the 1,000 delegates who will attend the October general assembly of the order in that city.

The deep cut on the new railroad at the Blue Mountain Gap, near Hamburg, is estimated to have cost over 200,000 dollars. The P. & S. R. will have but a single short tunnel between Philadelphia and Pottsville. The track has been laid and is now being ballasted, preparatory to the opening of the extension between Hamburg and Pottsville, which will take place at an early date.

THE COMING CONVENTION.

A GREAT GATHERING OF REPRESENTATIVE KNIGHTS OF LABOR.

RICHMOND, Va., Sept. 1.—"Yes," said Mr. W. H. Mullen, of this city, the district workman and member of the National Executive Committee, "the session of the General Assembly of the Knights of Labor which meets here October 4 will be an important one to the order. This body will meet in the Regimental Armory, the largest hall in the city. We will have a thousand delegates. The hall, I believe, will seat twice that number quite comfortably. Governor Fitzhugh Lee will deliver an address of welcome to the members of the body, which will be responded to by General Master Workman Powderly."

"What state will have the largest delegation in the body?"

"New York. Massachusetts will come next in order, with a delegation of about seventy-six."

"What, in your opinion, will be the most important subjects considered by the General Assembly at this meeting?"

"Well, I think the boycott and strikes will be among the most important subjects which will occupy the attention of that body. It is my opinion that changes will be made in regard to both of these matters. The name of boycott has grown to some what of a name. It may be that the silent boycott will take the place of the present system. At present a strike affecting twenty-five persons or more cannot be ordered without the sanction of the General Executive Board, to obtain which necessarily occupies a good deal of time. I think some change will be made in this matter. What, I cannot tell. Committees are now considering the questions of the boycott and strike and will submit their reports at this session of the national body. I think in future the question of strikes will be left to the state assemblies. In the coming year nearly all the states will have an assembly. Oh, yes, we have made considerable progress in the South. We are organizing very fast down there. If the strike of the Augusta cotton factory operatives is successful it will be like putting fire into light wood all through the South. Yes quite a number of the colored people in the South belong to the Knights of Labor."

"Who will be your best speaker in the General Assembly at this meeting here?"

"I think Mr. Fogg, of Michigan, will be the ablest speaker we will have. Charley Lichman, of Marblehead, Mass.; McNeil, of the same state, and Bob Schilling, of Chicago, are all first rate speakers."

"Despatches from Chicago intimate that Schilling is favorable to a socialist leader of the order?"

"Oh, yes, so far as I see. But there is nothing in that story. Powderly has no better friend than Schilling."

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PHILADELPHIA AND READING RAILROAD.

Arrangements of Passenger Trains

MAY 30, 1886.

TRAINS LEAVE SHENANDOAH FALLS:

For New York via Bound Brook route, 5.38 and 7.20 a. m., and 12.53 p. m. Via Allentown, 5.37, 7.20 a. m., and 12.53, 3.06 p. m.
For Philadelphia, Reading, 5.38 and 7.20 a. m., 12.58 and 3.06 p. m.
For Harrisburg, 7.20 a. m., 3.06 p. m.
For Allentown, 7.20 a. m., 12.58, 3.06 p. m.
For Pottsville, 7.20 a. m., 12.58 and 3.06 p. m.
For Tamaqua and Mahanoy, 7.20 a. m., 12.58 and 3.06 p. m. Additional for Mahanoy City, 6.10 p. m.
For Lancaster and Columbia, 7.20 a. m., and 3.06 p. m.
For Williamsport, Sunbury and Lewisburg, 7.20 a. m., 12.58 and 3.06 p. m.
For Mahanoy Plane, 5.33, 7.20 a. m., 12.58, 3.06, 6.10 p. m.
For Girardville (Rappahannock Station) 5.33, 7.20 a. m., 12.58, 3.06, 6.10, 9.15 and 10.15 p. m.
For Ashland and Shamokin, 7.20 a. m., 12.58 and 3.06 p. m.

SUNDAYS.

For Pottsville, Tamaqua, Mahanoy City, 7.45 a. m. For Ashland, Mount Carmel and Shamokin, 3.06 p. m.

TRAINS LEAVES FOR SHENANDOAH FALLS:

(SUNDAYS EXCEPTED.)

Leave New York, via Allentown, 8.20 a. m., 3.45 p. m., via Bound Brook route at 7.45 a. m., 1.30, 4.00 p. m. Leave Philadelphia, 5.50 a. m., 4.00 and 5.50 p. m. Leave Reading, 11.55 a. m., 8.10, 7.58 p. m. Harrisburg 5.50 a. m., and 4.00 p. m.
Leave Lancaster, 7.20 a. m., 3.40 p. m.
Leave Allentown, 7.20 a. m., 3.40 p. m.
Leave Pottsville, 7.20 a. m., 3.40 p. m.
Leave Tamaqua, 7.20 a. m., 1.30, 7.50 and 9.08 p. m. Leave Mahanoy City, 8.19 a. m., 1.50, 8.20 and 9.33 p. m.
Leave Mahanoy Plane, 6.30, 8.40 a. m., 2.16, 5.12, 8.40 and 9.33 p. m.
Leave Girardville (Rappahannock Station) 6.40 and 8.45 a. m., 2.35, 6.30, 8.47 and 9.33 p. m.
Leave Williamsport, 3.00 and 4.00 a. m., and 12.00 noon.

SUNDAYS.

Leave Pottsville, 2.00 p. m. Tamaqua, 2.45 p. m. Mahanoy City, 3.16 p. m. Ashland, 8.01 a. m. Mount Carmel, 7.24 a. m. and Shamokin 7.10 a. m.

For Atlantic City.

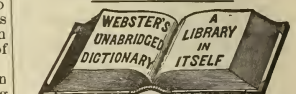
Leave Philadelphia, pier 8, foot of Walnut street.
Week-days—Excursion train, 7.00 a. m. Accommodation, 7.45 a. m. and 4.00 p. m. Express, with parlor cars, 9.00 a. m., 2.30, 4.00 and 5.15 p. m. SUNDAYS—Accommodation, 8.00 a. m. Express, with parlor cars, 7.00, 8.00 and 9.00 a. m.

Returning, leave Atlantic City, depot corner Atlantic and Arkansas avenues. Week-days—Accommodation, 5.35 a. m. and 4.25 p. m. Express, with parlor cars, 7.00, 8.10 and 11.00 a. m., and 5.25 p. m. From Excursion House, Mississippi and Pacific avenues, 7.03 p. m. SUNDAYS—Accommodation, 4.10 p. m. Express, with parlor cars, 4.00, 5.00 and 10.00 p. m. J. E. WOOLLEN, Gen'l Manager.

C. G. HANCOCK, Gen'l Pass'r and Ticket Agent

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ANTHRACITE COAL TRADE.

Great Activity Anticipated in the Next Three Months and an Increased Output.

The Philadelphia *Inquirer* comments on Anthracite business as follows: All the determination displayed by the Anthracite coal managers and all the brave talk in which they have indulged has been unavailing to stir up the retail buyers. They have been told time and time again that prices were to be advanced, and they have seen them pushed up whenever the managers meet, but somehow they won't buy. A few orders are coming in, but there is not the rush for coal that ought to occur at this season of the year. The retail trade is unusually backward, and the expected boom in the trade will not set in until it has started up.

Some of the companies have made preparations in anticipation of this event. The Delaware and Hudson has shipped a large quantity of coal west, to be stored until needed, and the Delaware, Lackawanna and Western and some of the other companies have done the same. The Reading has tried to keep up its stocks in England, and has a fair supply at its depots. Having made these arrangements, everybody is sitting down quietly and waiting for the boom to come along. It will not be started until household consumers begin sending in their orders for their winter supply, which so far they have not begun to do to any considerable extent.

There can be no doubt but that the boom will make its appearance before long. In the next three months 10,000,000 tons of coal will be required, or rather more than has been produced in the last four. In the same months of last year over 10,100,000 tons were produced, and in addition stocks were decreased 330,000 tons. It is hardly probable that less will be required this year. The following statement shows the probable production for 1886 and the actual output in 1885, the monthly production this year being estimated:

	1885.	1886.
To August 1.....	16,956,724	15,502,329
August.....	2,600,000	3,023,910
September.....	3,000,000	3,259,183
October.....	3,500,000	3,562,166
November.....	3,500,000	3,279,116
December.....	2,500,000	2,996,825
Totals.....	32,056,724	31,623,526

The stock on hand July 31, 1886, was about 30,000 tons less than on the same day last year. It appears that up to August 1 this year 1,450,000 more tons of coal had been produced than were mined in the same period last year. The Bituminous strike helped the Anthracite trade a good deal, and it is not unfair to assume that the trade this year will be 500,000 tons ahead of 1885. The collieries will have all they can do the rest of the year, and it is a serious question whether they can produce all the coal that will be needed. If everything worked smoothly, vessels were plentiful and there were no floods in the mountains, or strikes among the miners, the collieries might produce 3,500,000 tons in a month.

In October last year 3,562,000 tons were mined, but it was the biggest output in one month in the history of the trade. The quantity might be mined for one month, but well-posed engineers and operators doubt if it could be done for two successive months. The trouble is not with the collieries, but with the transportation companies. Cars cannot be had when wanted. To transport 3,500,000 tons of coal in a month would require 25,000 ordinary four-wheel coal cars every day, and the entire supply of such equipment on all the Anthracite roads would not contain more than five days production. It takes a car three days to make a round trip if immediately unloaded. When the long journeys made by some cars and the long time multitudes of others are detained on sidings, in retail yards, and the very respectable proportion always in repair shops are taken into consideration, it will be seen that the transportation problem is one of the most serious with which operators have to deal. Some of the Reading's collieries are now working on short time because a sufficient supply of cars cannot be furnished, and when it comes to increasing the output 25 per cent. there will certainly be trouble.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Sept. 4, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	48,824-19	1,411,793-17
Shipped South.....	33,791-01	1,787,993-07
Total.....	82,616-00	3,199,786-07
For corresponding time last year.		
Shipped North.....	60,292-18	1,377,012-10
Shipped South.....	58,772-11	1,594,228-10
Total.....	119,065-09	2,971,240-11
Increase.....		228,546-13
Decrease.....	36,449-09	

Philadelphia.

Ledger:—The situation of the Anthracite coal trade has not changed materially during the past week. All the coal coming forward from the mines is going into consumption, and the Anthracite stock at tidewater is being gradually reduced. On Saturday the Reading company had at Port Richmond but 62,000 tons of all sizes of coal, part of which was already loading into vessels for shipment. The wharves at that shipping point have been entirely cleared of lump and pea coal, while of broken only 1600 tons were on hand, the demand for those sizes exceeding the supply. The domestic sizes are of course not scarce, though the stocks of egg, stove and chestnut are unusually low for the Reading company, the quantities of those sizes being reduced to respectively 11,000, 32,000 and 16,000 tons. Prices continue to rule in quiet uncertainty, and the greatest advance is not being obtained, though some parties in the trade are already foolishly talking of a further advance it is said, to scare dealers and large consumers into purchasing their winter's supply of coal. Buyers, however, are apparently not being scared by any such unwise act, but, on the contrary, the latest advances have scared off parties who are now hoping that something may turn up to make coal cheaper again. Already there is talk of restricting the production of Anthracite next month to 3,000,000 tons, but by that time it is expected the coal trade will have become very active, and companies who have orders will in great probability assign for the coal necessary to fill them. The total shipment of coal and coke over the Pennsylvania Railroad (P. R. R. division), main line this year, to August 28th, was 9,708,399 tons, of which 2,204,888 tons was coke. This shows an increase in coal of 414,292 tons from the Clearfield district by the strikes, and the shipment of coke shows a gain of 528,063 tons. As will be noticed in the tonnage table below, the shipments of Anthracite via the Shamokin division of the Northern Central railway and the united railroads of New Jersey show a decrease of 62,192 for the former and of 23,824 for the latter, while all other Anthracite carrying companies show very handsome increases. The reduction assigned for these two companies falling behind last year's shipments to the corresponding date is the strike at the Pennsylvania railroad company's mines in the Lykens Valley and the Reading railroad having taken possession of the Sterling, Henry Clay and the Big Mountain collieries in the Shamokin district, which were formerly operated by individuals and the tonnage was then given to the Pennsylvania railroad.

There has been trouble brewing for a long while past between the Pennsylvania and Reading railroads over a division of the Anthracite coal tonnage coming down the Schuylkill valley when the former road will have completed a new line through Pottsville to New Boston, where connection is to be made with the Lehigh Valley railroad. The history of the Reading, aided by the late Mr. Vanderbilt, reaching out via the Beech Creek road into the Clearfield Bituminous coal district for tonnage of a class hitherto monopolized by the Pennsylvania railroad is well known. The building of the Pennsylvania Schuylkill Valley railroad, it is said, was partly a retaliatory measure, that road entering as a competitor for the Schuylkill Anthracite business, formerly almost entirely controlled by the Reading company, in return for the Reading having gone into what was claimed as Pennsylvania soft coal territory. The Bituminous traffic when the Beech Creek road was built, paid about one-half cent per ton per mile tonnage, while the rate charged on Anthracite was full two cents per ton per mile. To be sure Bituminous coal had to be hauled 300 miles or thereabouts, so that the gross sum received for carrying it amounted to nearly \$1.50 per ton, or perhaps a little more, while Anthracite was only carried 90 miles to tide, paying \$1.80 per ton. During the past two weeks meetings of the agents of the Lehigh Valley railroad, and the Pennsylvania railroad have been held in this city to fix tolls on Anthracite from Mauch Chunk and Schuylkill Haven to Philadelphia, a strenuous effort being made by some parties to advance the rate to \$1.60, all rail, which efforts were ineffective. This inaction, a hitherto almost unknown thing, created considerable surprise, and the representatives who attended these meetings, when questioned upon the subject, declined to talk, or else turned the questions aside by such statements as "no change has yet been determined upon, but an advance may come any day," or "we had not a quorum at the meeting." The effect of the inability of the carrying companies to reach a decided conclusion as to whether or not to advance the tolls has been to keep the Anthracite trade in a somewhat unsettled condition, as shippers could not depend upon the stability of the rates of tolls. Upon completion of the tunnel at Pottsville, which will require about five weeks yet, the Pennsylvania Schuylkill Valley branch will be opened through Pottsville to its connection with the Lehigh Valley railroad at New Boston Junction, and a connection with St. Clair will be made via the Pottsville and Mahanoy railroad and the Lehigh Valley. The work of construction on the Nesquehoning railroad is also in progress, and connection will be made at Nesquehoning with the North and West branch railroad, which will give the Pennsylvania railroad from Philadelphia a new through and shorter line to Wilkes-Barre and Williamsport. The Pennsylvania is now compelled to haul its Anthracite over the rest of a quadrangle from the mines to this city. At present the coal must be hauled west to Shamokin and Sunbury, and thence south and east to Philadelphia, via Harrisburg. By the Schuylkill

Valley route it will save one-third that distance, give business to the new line, and relieve the congested condition of the main line between Harrisburg and Philadelphia, and afford it additional facility, for a more profitable class of traffic. During the Spring of this year agents, believed to be in the interest of the Pennsylvania railroad, were reported to be endeavoring to induce individuals operating mines along the lines of its new route where coal is now shipped via the Reading road to give their tonnage to the new line upon its completion, and extraordinary inducements were held out. Offers were made, it is said, to not only remove, rebuild or construct entirely new breakers of increased capacity, but to guarantee a market for the output of coal as well. These reports were at that time denied, but have since been renewed. Now it is rumored that the Pennsylvania railroad has determined that it is not proper or honest to have two rates for the same class of freight, and that, so far as the Pennsylvania is concerned, soft coal cannot be charged \$1.50 for a long haul and Anthracite \$1.80 for a haul of less than one-half the distance. This, it is believed, is the real cause of the tolls not being advanced on the 1st instant, as has been the custom with the Anthracite companies almost since their beginning. The Pennsylvania railroad will soon be in a situation to furnish the people of Philadelphia with cheaper coal than it has ever enjoyed, and the outcome of the meeting of the Anthracite freight agents, which has been called for to-morrow, will be looked for with much interest. The Lehigh Navigation Company during the past year or two has been pushing its claims in the more northern part of the market, bringing via all rail, and, on account of the superior character of its coals, has found purchasers. Recently the Pennsylvania Railroad has completed a connection with the West Shore railroad through Jersey City, and large quantities of Bituminous coal are said to have gone east via all rail that way. The building of the Poughkeepsie bridge across the Hudson river will give a new and much shorter outlet from the Anthracite and Bituminous fields to New York and New England, and this will compete largely with the coasting vessel trade and will also give many little eastern towns both classes of coal at any time of the year. Heretofore, on account of the early freezing of the smaller rivers and creeks, coal had to be stored before winter set in.

The total amount of Anthracite coal sent to market for the week ending August 28, as reported by the several carrying companies, was 376,237 tons, compared with 734,004 tons in the corresponding week last year, a decrease of 357,767 tons. The total amount of Anthracite mined thus far in the year 1886 is 19,747,430 tons, compared with 18,572,719 tons for the same period last year, an increase of 1,174,711 tons. The following statement gives the gross tonnage of each of the leading coal carrying companies for the week ending August 28, and for the year to same date, compared with the respective amounts carried to the same date last year.

	Week	1886	1885	Difference
Reading R. R.....	250,446	9,087,281	8,531,893	1,555,388
Lehigh Valley.....	100,468	4,714,430	4,147,961	566,469
D. & L. V.....	76,961	3,117,171	2,852,175	264,996
Shamokin.....	14,579	548,158	610,350	62,192
Del. R. R. N. J.....	30,216	1,044,050	1,067,874	23,824
Penna. C. & D.....	39,541	893,142	801,061	92,081
Del. and Hudson.....	81,888	2,593,522	2,259,823	333,699
Pa. and N. Y.....	39,850	1,292,475	1,068,318	224,157
Del. and N. J.....	10,147	423,817	412,131	11,686
Hun and B. Top.....	10,147	442,817	403,758	39,059
Nor. and Wm.....	10,350	540,872	371,044	169,828

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending August 28 was 282,034 tons, of which 221,495 tons were coal and 60,539 tons coke. Of this weekly tonnage 216,346 tons originated on the main line of the Pennsylvania railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 9,708,399 tons, of which 7,503,511 tons were coal and 5,204,888 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading Railroad reports that its coal shipment for last week, ending September 4, was 222,000 tons, of which 28,000 tons were sent to and 40,600 tons shipped from Port Richmond, and 32,000 tons were sent to and 32,000 tons shipped from Elizabethport. Vessels are in plentiful supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 85c. 90c. and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending August 28 were 73,772 tons, and for the year to that date 1,403,892 tons, a decrease of 367,672 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—Week, 50,196 tons; year, 1,100,480 tons; decrease, 188,301 tons. To Pennsylvania railroad—Week, 1933 tons; year, 171,625 tons; decrease, 99,370 tons. To Chesapeake and Ohio canal Week, 12,543 tons; year, 131,887 tons; decrease, 80,001 tons.

It is said that the Hartford Silver Plate Company have discovered a transparent enamel, which they are applying to their hollowware, which seems to offer complete protection against the tarnishing that has been such a perplexing element in the silverware business.

A RICH COPPER MINE.

What is to Make the Commercial and Industrial Future of Blue Wing, N. C.

One of the richest copper mines in the world is located at Blue Wing, N. C., and is owned by the Big American Reduction Co. Operations have been successfully and vigorously prosecuted for two years, and the value of the ore has proven itself to be fabulously rich. The amount of ore in the mine is inexhaustible in quantity, and notably rich in quality. It will net many millions of dollars for the benefit of its fortunate stockholders. Geologists and experts estimate it to be worth over \$100,000,000, 12,000 to 15,000 tons of rich ore are in sight and surrounded. Taking 12,000 tons at \$55.00 a ton, (value of copper ore,) it will yield \$660,000. The cost of mining and smelting being \$10.00 a ton or \$120,000, leaves a net profit of \$540,000. The silver which the ore contains is worth \$25.00 a ton, thus more than paying for the mining and smelting, leaving the copper production a net profit. The value of the silver in the ore increases as excavations progress. The amount of refined copper in one ton, is as much on an average, as the amount in three tons of the Lake Superior mine, which paid 135 consecutive dividends, or \$27,350,000. Copper mines have proven to be more substantial and profitable than gold and silver mines, having paid \$50,000,000 more in dividends than the latter. This company can pay a dividend every three months after smelting operations are begun. On account of the cheapness of labor and fuel they can mine, and refine copper for 5 cents a pound. A railroad is now in course of construction from Blue Wing to Clarksville, a distance of 16 miles, and up to within 93 feet of the mines, and will greatly facilitate operations.

A limited amount of stock is now for sale at par (\$50). The object of the company being to increase its working capital, to erect smelting works and begin at once to smelt the ore. After the disposal of sufficient stock for this purpose there will be no more offered at present price. 4000 shares is the amount of capital which is held by a few parties for investment. Individual stock is not offered for sale at any price. The stock is not assessable. Any number of shares can be taken from one share up. The general office of the company is at Dillsburg, Pa. The officers are: President, John N. Logan, banker, Dillsburg, Pa.; Treasurer, Jos. Deardoff, banker, Dillsburg, Pa.; Vice President and Superintendent at Mines, Wm. Raker, Blue Wing, N. C.; Secretary, W. B. Beitzel, freight agent, Dillsburg, Pa. The Blue Wing and Clarksville railroad has been chartered under the laws of North Carolina and Virginia for the purpose of building and operating a railroad from Durham, in Durham county, N. C., to Clarksville, Mecklenburg county, Va., a distance of 62 miles, passing through the towns of Blue Wing and Raker City, opened up one of the wealthiest timber, mineral and farming sections in the country. Raker City, situated sixteen miles southwest of Clarksville, is destined to be a place of importance, on account of its being situated in the copper mining district, pronounced by Professor Hunt (one of our great geologists,) as being one of the richest copper mines in the United States, and perhaps in the known world, and the product as easily mined. The mines are at present operated, making a fair profit, which after the completion of the sixteen miles of road aforementioned, will be equal to any mining dividends in the land. The timber consists of the best of yellow pine, so extensively known in the Middle, Eastern and Northern states as North Carolina pine, used in the manufacture of railroad cars, &c. It also abounds in immense tracks of white oak timber, the finest known. The land is well adapted to raising different kinds of grain and grass. Also for raising the celebrated Durham tobacco, so highly recommended and largely sold in the market. This part of the road is already let and under contract, and several miles at the Raker City end is already graded ready for the ties and rails. Durham City, situated in Durham county, at the southern terminus of the road, has a population of about 12,000 inhabitants. The road when completed will make the route north to Clarksville and Richmond, Va., about 65 miles shorter than by the present road, which will be quite an inducement to shippers and travel, on account of the vast saving of fare and freight, making it the most direct line to Richmond, Va., from which Baltimore, Philadelphia and New York trade can be reached. It will also be one of the best paying lines on account of trade north and south, including the opening of this heretofore undeveloped rich section of country. Almost the most direct line south, passing through Raleigh, the capital of the state of North Carolina, being situated about 25 miles southeast of Durham City.

The inhabitants are very anxious to have the above described road completed, and are rendering every aid in their power to push it toward completion, knowing full well the vast benefit to be derived from this public thoroughfare. Taking everything into consideration, this is destined to be one of the best paying lines of road in the country.

Cost of Building Materials Fifty Years Ago.

Turning over some old papers the other day, we came upon two or three bills for carpenter work and plastering, dating back to 1821 and 1822, which have a certain interest, as showing the value of work and materials at that time, compared with the prices now current. One thing which surprised us, and will perhaps be equally surprising to our readers, is that the cost of lumber, keeping in view the comparative purchasing power of money, was at that time far greater than it is now. Sixty-five years ago a large part of the United States which is now cleared was an unbroken forest, and every township in the eastern states must have contained a good deal of timber of the original growth, yet we find "refused boards" charged in 1821 at \$11 a thousand feet, which would be a high price now, while painters' work, which is the only labor we find charged in the bills just now before us, is put down on the bill, which would naturally include profit, at 7s. 5d., or \$1.25 per day. Contrary to the general impression, spruce and hemlock seem to have been very generally used, and we find items of hemlock boards at \$11 a thousand feet, and spruce at \$14 or \$15. Clear pine plank, which many people imagine to be a much scarcer material now than in the days when second-growth timber was unknown, is charged in the bills at \$50 a thousand feet, which would be a tolerably high price in the same locality today, and corresponding then to about twice the value, in the form of labor and cost of living, that it could be exchanged for now. Of some materials the cost seems to have been even greater then than at the present. In a bill for painters' work, dated 1827, we find oil charged at 23 cents a quart, which, even allowing for profit, is a higher price than most architects would now approve in a day's work bill, and varnish is put down at the rate of \$4 a gallon, a charge which would just about pass an architect's criticism in these days. One of the items is for "green paint for chairs," so that if any of our readers are of an archeological turn of mind they may make a note here that the fashion of covering furniture with this ugly and adhesive coating, which has not dried out even in our own college days, dates back at least fifty-nine years. The credits on this bill, which amount to about \$70, include items of thirty-five bushels of potatoes for 30 cents a bushel and two barrels of cider, differing apparently either in size or quality, as one is credited at \$2, and the other at eight shillings, Massachusetts currency, or \$1.33.—*American Architect.*

Automatic Gas-Extinguisher.

The life of those who become exposed to an atmosphere of illuminating gas depends largely on the amount of carbonic oxide it contains. If made in the old-fashioned way, from coal, the quantity of the substances present is comparatively small, but the cheaper "water-gas" carries much more and consequently a fatal dose can be got from the latter much sooner than from the former. The danger from this source can be avoided only by general public enlightenment, supported by appropriate legislation. As to automatic protection against open burners, the Patent Office records show that a number of inventors have given the subject attention. Most of their devices are applications of the thermostatic principle—a strip or coil of metal expanded by the heat of the flame contracts when the flame is extinguished, and in so doing closes the burner. One ingenious contrivance depends for its action on the incandescence of a substance suspended in the flame. If the flow of gas is temporarily interrupted, the flame is rekindled by the incandescent body. As a matter of course, no automatic arrangements, however complete, can be relied on as a perfect substitute for human watchfulness; and the general introduction of a self-closing gas-burner would not relieve the householder of the duty of looking after leaks. It could only be counted as an aid in avoiding danger; otherwise risks might sometimes be increased from too great dependence on mechanical protection. As a special educational measure all hotels and other like places where gas is used for lighting should be provided with printed instructions posted near the fixtures, by which the way of treating gas would be made so plain that scarcely any one who could read would be liable to make a mistake.

Copies of the New Mine Law.

We had printed a large number of both the New Anthracite and Bituminous mine laws of the State for sale at this office, but we found the demand for them so large that both have already been completely exhausted. We therefore printed another and larger edition of each of the laws mentioned for those who desire them. They have been carefully read and compared with certified copies from the Governor. The price per copy of either the Anthracite or Bituminous law is only 10 cents. Not a single miner in the State can afford to be without the law affecting the region in which he resides.

Statistics of Mines.

Within the last few months, the *Manufacturers' Record* has been publishing lists of the leading, or best known, mining properties in several of the counties of North Carolina. So far, nine counties have been reported. They are the leading localities in the State and a brief review of them will prove of interest. The following table will show briefly the number of mines and the area in square miles of each county.

County.	No. of Mines.	Sq. Miles.
Bowen.	71	159
Stanly.	21	380
Mecklenburg.	62	680
Cabarrus.	65	400
Montgomery.	30	570
Allegheny.	11	300
Burke.	10	400
Randolph.	38	721
Davidson.	27	690
Total.	341	4,500

This is certainly a good showing for North Carolina, when the number of mines and the extent of the area are considered. The above table represents only about one-third of the mining area of the state. Gold has been found and worked, to more or less extent, in more than 30 counties. All of these, save Allegheny, are cismontane, and all, adding Burke to the above exception, are in the so-called "gold belt" of the state.

A rancher near Albuquerque, New Mexico, recently commenced digging for a well on the site of an old ruined pueblo. At eight feet he struck a huge bowlder. Underneath this was found masonry, and when this was pierced a cavity was discovered. Upon examination it was found that the workmen had penetrated through an arch of stone, supported by heavy pillars of masonry and large pine timber. When the debris was cleared away a volume of pure water was disclosed sufficient to supply a great number of cattle. Among the discoveries made in the vault were stone axes and hammers, flint knives, arrowheads, and quantities of pottery in fragments. Human remains were also brought to the surface, including two skulls in an excellent state of preservation. The building is supposed to have belonged to an extinct race of people, as the relics found evidently antedate anything hitherto discovered in this territory.

Joseph Nathanson, the emigrant agent and interpreter of the Pennsylvania railroad, recently found on the west bound emigrant train a young girl who had been robbed of her money by a fellow passenger. Telling her he would find her money, Nathanson borrowed a carrier pigeon, closed the car window so that the bird could not escape and addressed the passengers, telling them that the bird would alight on the head of the one who had committed the theft. He released the bird just as the train entered the Spruce creek tunnel, and on striking a match found a suspected woman crouching between two seats and waving her hands above her head to keep the bird away. She gave up the money.

A pocket mirror is a very useful thing to an engineer sometimes. By the aid of one recently a friend located a leaky boiler tube directly, after he had searched hours for it unsuccessfully. A beam of reflected light thrown into the furnace from the mirror revealed the fault at once. A mirror is handy for machinists also, and all who are engaged in erecting work.

Prof. Henry Wurtz, the eminent chemist says: "I will venture to announce as my own conviction, which, however visionary it may be deemed by many, I claim to be strictly founded on induction from known facts, that, throughout large sections of the United States (throughout the middle tier of counties in Western New York for example), every town, nay, every house in the land ought to be both warmed and lighted by gas drawn from the bountiful bosom of Mother Earth, without money and without price."

The Lawrence Machine Shops, Lawrence, Mass., are making a boiler feed pump, which may also be used for various purposes, which is quite on a new principle. It is so arranged that both the up and down stroke of the piston will force water into a common discharge pipe from one feed pipe. It is also arranged that by opening a valve the water may be pumped over again ad lib. This enables the supply to the boiler to be stopped without stopping the pump if such a necessity should arise, as is often the case where a pump is supplying water too fast. Patents are being secured on this pump.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F. M. Co. Box 115, Newport, Ky.

AN IMPORTANT DECISION.

The Supreme Court of West Virginia Pronounces Natural Gas not to be Property.

Whether natural gas is property in the eyes of the law, and if so, under what limitations it can be so held, is a question that has either puzzled the courts or has been ingeniously evaded where cases admitted of a decision being rendered on other points. Judge Paxson, of the supreme court of Pennsylvania, in a recent case admitted that it was not susceptible of an abstract legal definition, and that it should be determined, at least so far as it related to the phrase in oil leases: "Oil or other mineral or volatile substances."

Judge Snyder, in a case just decided by the supreme court of West Virginia, in which the question squarely arises, has associated natural gas in the list of natural elements in which there can be no property, in a general sense, as light, air and water. The case was as follows: A landlord leased to his tenant certain premises for the purpose of mining and taking carbon oil therefrom at a fixed royalty, and for other purposes; the tenant opened a well which produced both oil and hydro-carbon gas, the former in small quantities pumped from the well for which the royalty is paid, and the latter in large quantities, issuing by its own force from the well, and which is separated from the oil by the tenant, and by means of pipes conducted beyond the leased premises, where it is either sold or appropriated by the tenant for his own use without accounting to the landlord therefor. In a suit brought by the landlord for an account and the value of said gas, the court held that the tenant is not accountable to the landlord for said gas or its value. The court says: "While the grant is for the specific purpose of mining for and removing carbon oil and for none other, still there is necessarily including in this grant all the incidents essential or naturally pertaining to its enjoyment. Included in these are the elements, such as light, air and water. And having the legal right to enter upon and occupy any portion of the premises, the appellant could without becoming a trespasser or incurring any liability to the lessors, use and appropriate anything it might find thereon which is not the property of another, and as animals, feral nature, or waters percolating through the land, even though by such use and appropriation it may deprive another having an equal right, of the power to do so. These are not the subjects of absolute property, and therefore by the *jure nature*, being capable of a qualified ownership, they belong to him who first appropriates them. If the hydro-carbon or natural gas now in controversy belongs to the class of things which are incapable of being absolute property only, such as those above mentioned, then it is clear this gas was not the property of the plaintiff, and the appellant is not liable for its use and appropriation; but if on the other hand said gas is susceptible of absolute ownership, then it is a part of the reality of the plaintiff to which the appellant acquired no right under the lease, and it is therefore liable to the plaintiff for the value of the same. The important and decisive inquiry in this case is, therefore, to which category does hydro carbon gas belong?"

Judge Snyder then refers to the "eternal fires" of Baker on the Caspian sea, which have been burning from remote ages, are due to gaseous hydrocarbons issuing from and through petroleum deposits. He refers also, among others, to the gas obtained in the beds of rock salt in the province of Szechum, in China, at a depth of 1,500 or 1,600 feet. "It is apparent from this history," Judge Snyder then says, "of the nature and properties of natural gas, that it partakes more nearly of the element of air and water than it does of those things which are the subject of absolute property. It is more volatile than the air, and when tapped in the earth it escapes more readily. When the supply is withdrawn from one place, it flows of its own accord from other points and replaces that which has been withdrawn. What distance or from what source it comes is the subject of conjecture only. The well or means of escape may be on one farm or in one county, and the reservoir or source of supply may be under other farms or in other counties more or less distant. Like water percolating beneath the surface, it may, by sinking a well or otherwise, be to the detriment of one person on his farm, while the supply may come from an adjoining or many distant farms. The right of the appropriation is so absolute in the case of water flowing underground, that if the owner of land, in digging a well or cellar or working a mine on his own premises, cuts off the source which by percolation supplies his neighbor's well, and thereby diverts it into his own or drains the well of his neighbor, the latter is without remedy."

"By analogy, therefore, it seems to me the rule and principles which pertain to air and water and other subjects of the same nature, must be applied to the natural hydro-carbon gas involved in this suit. The appellant, therefore, could not certainly be guilty of either legal or equitable waste in use of

said gas. If this were an open spring producing oil and gas, instead of a well, 1,000 feet deep, or such a natural emission of gas as that at Bloodfield, in New York, or that at the Burning Spring, in Wirt county, there could be no more question; it seems to me, as to the right of the lessee to appropriate the gas, under the provision of this lease than there is of his right to use and consume the air and water upon the premises. What difference then, is there between these cases and the well in question, which was opened in express conformity with the the written terms of the lease?"

Coking Coals of Jackson, Ohio.

When several years ago we examined the coals of Jackson county, we pronounced the limestone coal as fitted for making coke, if crushed and washed. But the demand for coke was so limited and the development of the Wellston seam so remarkable, that mining men paid little attention to the limestone bed. The Wellston seam has now about reached its annual height of output—namely, 1,000,000 tons, and the attention of business men is turning toward the other seams of the county. In the present period of depression in the iron business when furnace men are obliged to curtail every possible expense, a coal which will make a good coke would be a godsend. We have such a coal. All that is required to fit it for making good coke is that it be crushed and washed to free it of its impurities before it is put in the coke ovens. The iron men of Lawrence county have by actual tests demonstrated the quality of the limestone coal for coking purposes, and there is no longer any question about the matter. This coal overlies the limestone ore only a few feet; the grey limestone itself, lying between the coal and the iron ore. In no other region in the world are all the elements which enter into the manufacture of iron found so close together as in Jackson and other counties which constitute the Hanging Rock region of Ohio. The area of coal iron is past, never to return, and what is needed is new men with new ideas and new capital to develop our extraordinary mineral resources. Looking at the development of the coal trade of Jackson county during the past five or six years, we have reason to feel proud of the position the county has assumed, and of the wealth that has been wrested from the bowels of the earth. In this short time we have leaped from the twentieth to the third producing county in the state, and these past triumphs are but the forerunners of what is to come. With such great resources as a bountiful nature has given us, there is no such thing as standing still. Onward and upward is written on every hill and in every valley of the county. The old charcoal furnaces will be replaced by large and elaborate stone coal structures, capable of turning out fifty to seventy-five tons of iron daily, and it will take centuries of active work to threaten exhaustion to our mineral stores. As the Hanging Rock iron region of Ohio was the first to develop the manufacture of charcoal in the state, so will it be the last to see the fires go out of the stone coal furnaces. We possess the native resources and there can be no such word as fail.—*A. Roy, Coal Trade Journal.*

How Bohemian Glass is Colored.

The ornamentation of the glass is done partly in connection with the exposure of the furnace and partly in the finishing shops where the work is completed by cutting, polishing, tarnishing, etching, painting, and mounting in metal. The glasshouses have at their command a very complete color scale for transparent, opaque, and clouded glasses. But it must not be supposed that a crucible is placed in the furnace for each color, from which glass colored for each ornament is to be made. The colors are worked out by means of what are called pastes which are kept on hand in sticks or cakes. From pieces of these pastes, previously warmed till they are soft, suitable quantities are cut off, laid upon the foundation of white or colored glass, and then spread out by drawing or blowing. By this means only is an economical use of such costly materials as gold and silver compositions possible. Some of the glasses thus treated—gold, copper, and silver glasses—remain still little, or not at all, colored after the melting, shaping, and quick cooling, and do not take on their bright hues until they are reheated. This is the case with the new yellow silver glass, which continues uncolored after the intermelting of the silver salt until it is exposed in the furnace again. Very fine effects are produced by blending or overrunning of paste colors, provided proper attention is given to the laws of harmony. A blue glass cup is, for example, overlaid with silver glass at its upper edge, and this is drawn down in gradually thinner tones till it fades away at the foot of the vase. Gold and copper ruby colors are thus combined with green glasses, etc. Another brilliant effect is produced when a still hot bulb of glass is rolled in finely pulverized aventurin glass, and after this is melted, and previous to the shaping of the vessel, is overlaid with a coating of either colored or colorless glass.—*Popular Science Monthly.*

SAFETY LAMPS FREE.

Every mine boss should possess a good safety lamp, even if the mine does not give off fire-damp. There is no telling when it will make its appearance, and a safety lamp may be wanted at any moment for purposes of investigation. Any person sending us five new yearly subscribers and the money for the same, can have Williams' improved safety lamp or the Boss' pocket safety lamp sent free.

Thunder Storms.

From certain meteorological statistics recently published in Germany, we learn that thunder storms in that country have during the last thirty years, been steadily increasing both in frequency and severity. The number of deaths per annum from lightning has increased in a far greater ratio than that of the increase of population. In the present state of our knowledge of the whole subject of atmospheric electricity, the cause of the phenomena of thunder storms is confessedly obscure. It is, however, very possible that some light would be thrown upon the question by a comparative study of the frequency and severity of storms during a long-extended period and over a wide geographical area. The German savants incline to the opinion that the increase is to be attributed to the enormously increased production of smoke and steam which has taken place during the last three decades. But although we may admit this to be to some extent a probable *vera causa*, yet, when we consider the very local character of thunder storms, we should naturally expect to find that it would follow that the neighborhoods of large cities, and especially of manufacturing districts, would suffer the most severely. But the statistics referred to show distinctly that the very reverse is the case. The number of storms attended by fatal results from lightning is far larger in the agricultural districts than in the towns. Upon the other hand, we ought to take into consideration the protective action of lightning conductors, with which the prominent buildings in the towns of Germany are well provided.

Japanese Engineering.

Before leaving Japan Prof. J. A. L. Waddell, late professor of engineering at the government university at Tokio, delivered an address by invitation before the engineering society, in which among other things he discussed certain classes of Japanese engineering work. The first topic was the common country roads, a subject which even in this country requires urgent attention. The cause of their unsatisfactory condition has been, "and to a great extent still is, that the building and maintenance of these roads are not left to engineers, but are intrusted to subordinate officials, who have not been educated for such work. Instead of raising the road-bed above the natural surface of the country and avoiding cuttings wherever possible, they have dug it from 1 to 3 or 4 feet deep, making the road act as a drain for the surrounding country. Not content with attracting as much water as possible to the road, they have endeavored to keep it there by planting close alongside rows of trees with thick foliage, or dense bamboo groves, that most effectually keep off both sunshine and wind, the two great natural maintainers of good roads. Too often even on the better class of roads the side ditches are either omitted altogether or are allowed to fill up, or are not made large enough. Within the last three or four years I have noticed a great improvement in the streets of the Tokyo-fu, but outside thereof the condition of the roads is very little better than it was when I first came to this country. The city streets of the Kyoto-fu are in a wretched state, owing to the fact that large unbroken stones are employed for surfacing."

A young man in the interior of Africa has invented a change in the construction of the steam engine which may lead to wonderful things. He dispenses with the steam chest and the governor balls that have for so long been regarded as indispensable to every engine, whether well regulated or otherwise. In place of the latter he employs a pendulum which permits the outflow of steam at unvarying speed, but the slightest increase of velocity in the engine lessens the time that the steam has to escape into the cylinder. The apparatus thus effects an instantaneous check upon its own irregularities, which are comparatively slow when the governor is used, and it has the additional advantage of using less steam, while it largely simplifies the working gear. A trial engine was constructed quite recently, and works to a charm. It was taken down for shipment to Minneapolis, where it will be practically tested at real work. If it succeeds as well as it now promises to do it will probably be the first of many thousands of engines built on the new plan.

It has been recently reported that coal, oil, and gas have been discovered in the vicinity of Albany, N. Y. Were this true the ancient city would have a future, before which, all the achievements of the past would be as nothing. But unfortunately there is very little foundation for the reports. Regarding coal, Prof. Hall, the state geologist, says: "To one acquainted with the geological formation of the state of New York, the existence of any quantity of coal, beyond occasional deposits of lignite, will be seen to be impossible. The rocks of New York state belong to the older series, below the carboniferous, with the exception of a volcanic break at the Palisades, and the alluvial formation of Long Island. The coal measures lap on over our slate, sandstones and sandstones, in Pennsylvania. If we would look for coal we must dig up, not down. Occasionally bits of lignite are found in the Catskills and in other localities, but they are as specks of dust upon the surface, like the deposits of gold, of which so much is occasionally produced."

J. C. Holmes, living about two miles from Williamsport, Pa., while digging a well struck a seam of coal about three feet in thickness. Appearances indicate that it is the extreme outcropping of a large seam.



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-AT-

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FOR THE WEEK ENDING

SATURDAY, SEPTEMBER 11, 1886.

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BUSINESS PROSPECTS.

The latest information from the leading industrial centres of the country is of the same tenor as that which has been received the past six months, and uniformly shows an increase in the volume of business being transacted as well as a slight advance in prices in many branches of trade and manufacture, and a general hopeful feeling for the future. The bank exchanges of the chief cities of the country show that the volume of business is larger than a year ago—in many instances astonishingly so. The exchanges for last week at New York were but 2 per cent larger than for the corresponding week in 1885, but at Boston they showed an increase of 7 per cent., at Philadelphia they were 10 per cent. larger than last year, at Baltimore 11.5 per cent. larger, at Chicago 29 per cent. larger, at St. Louis 26 per cent., at San Francisco 30 per cent., and at New Orleans about as large. These figures show also that the gain is principally in domestic trade, as New York, which is the chief importing city of the country, shows but an insignificant increase in the volume of its trade, as compared with the increase in the inland and manufacturing cities.

It is an encouraging fact also that the disposition of New York business men with regard to the holding or disbursement of gold has undergone a change during the past few weeks. This is evidenced by the fact that, while less than four per cent. of the custom house receipts for August were gold, nearly 40 per cent. of last week's receipts were in that coin. This change implies an abatement in the desire to withhold gold, if not the failure of the attempt to put it to a premium by combining to control it. Those who pointed to its withdrawal from circulation as a sure indication of a decline in the value of silver, explain its return by declaring that the treasury is paying out gold more freely than heretofore. This is probably correct, and the treasury failing to comply with the conditions of the combination, the other members have concluded to release the gold. Whatever the cause of the failure to drive gold to a premium may have been, it is fortunate that the failure has occurred. The recent stringency in the money market has been partially caused by this attempt to bring silver into disrepute by withholding gold from circulation and this occurring at a time when the country is recovering from a period of business stagnation and when an abundance of money is required to move the fall crops, was calculated to do immense damage to business, and might, if it had succeeded, arrest the industrial development which the nation is now experiencing. The bond calls recently issued by the government have also been instrumental in checking the monetary stringency. In this connection it may also be mentioned as a significant fact that notwithstanding a premium is demanded on gold at Paris and Berlin, and the bank of England rates have been advanced, gold still continues to come this way. No matter upon what theory this may be explained, it substantially disproves the claim so defiantly made during the past winter and spring that the continued coinage of silver here would drive gold out of circulation. This fallacy is now exploded and the combination to bring it about is apparently broken up.

The iron trade continues in the same healthy condition which has characterized that branch of industry during the summer. A few sales of eastern pig have recently been made at prices 50c. to \$1 higher than heretofore, and finished iron continues in good demand at fair prices. Steel rail orders for 1887 delivery are already in the market, with the mills well supplied with orders for the next four months. The same may be said of the iron furnaces. Their production is well sold up and orders in advance are plentiful.

The Anthracite coal trade has materially improved within the past few weeks, as is evidenced by the recent advance in prices. It has taken the coal combination eight months to demonstrate its ability to control the trade, but by harmonious action, it has succeeded in bringing the trade into a healthy condition, and by following closely the plans mapped out for the management of the fall trade, a good business may be anticipated. Attention is now being turned to the management of the trade for next year, and some apprehensions are felt regarding the probable attitude of the Reading company in the event of a change of management. The proceedings in the foreclosure suit now pending will not be ruled upon before January, or until after the election of

officers by the company, and then should foreclosure follow, it would be difficult to determine what stand the company might take. This, however, is a long way off, and no matter into whose control the management of the Reading may fall, they will find it to their advantage to help control the production of Anthracite coal.

The most troublesome subject that the Knights of Labor convention will be called on to deal with will be the curbing or expunging of the socialism that is creeping out so obnoxiously among a portion of its membership. These socialistic doctrines develop themselves mainly in the west, but New York furnishes a strong contingent and the united forces mean to make trouble if they can. Some of the K. of L. leaders affect to think lightly of the socialists, but the cooler heads with prophetic visions see in them a serious impediment to the society's weal.

REFERENCE to Mr. Mauchline's article on detaching hooks this week will show that he is not favorably impressed with their utility. And in his view there is a wide concurrence of opinion among practical miners and operators.

Chicago.

From the Industrial World.

The week has witnessed quite a marked improvement in the local trade. Orders from the local dealers have been increased, and the call for coal for the country has also improved. Dealers complain of a scarcity of some of the sizes in hard coal, and claim to be fifteen to thirty days behind in their orders. On account of the scarcity of coal many of the dealers are experiencing some difficulty in obtaining Anthracite, and say they have had no receipts for a week past. Coal is somewhat scarce at the Eastern lake ports, and the determination on the part of the Anthracite producers to mine only 33,500,000 tons during the year is working like a charm. The allotment for September will be 2,750,000. Lake freights are higher and firm at 75 cents.

Shipments of Anthracite from Chicago to the West are falling off somewhat, owing to the lightness of receipts. Inquiries, however, are better, and dealers have made numerous sales of round blocks. The wholesale price is steady at 25 cents today, but the retail prices show an advance of 25 cents today, and are quoted at \$6.25 and \$8.50. Merchants have had a thriving business during the last few days from consumers who were anxious to place orders before the expected advance.

Bituminous coals are showing a little more activity, and the movement in the same is becoming more general. We hear of no change whatever in prices.

Cannel coal is coming in better request, though dealings in this grade have, as yet not assumed much activity.

There is nothing new of importance in the coke market. The supply is adequate to the demand, and prices are steady.

Charcoal is without formal change, either in demand or price.

We quote wholesale prices to consumers as follows f. o. b. Chicago:

ANTHRACITE.	
	Per gross ton by carload, 2240 lbs.
Grate.....	\$ 5 70
Egg.....	5 70
Stove.....	6 00
Nut.....	6 00
Lehigh Lump.....	7 00
	Per net ton by carload.
Grate.....	\$ 5 13
Egg.....	5 13
Stove.....	5 38
Nut.....	5 65
Lehigh Lump.....	5 38
BITUMINOUS.	
Erie & Briarhill.....	\$4 15
Pittsburgh.....	3 20
Indiana Black.....	2 40@2 50
" Slack.....	1 25@1 35
" Nut.....	1 55@1 80
Baltimore & Ohio.....	2 75@2 90
Hocking Valley.....	2 75@2 90
Youngsberry.....	2 75@2 90
Wilmington.....	3 20@3 30
Blossburg.....	2 10
Cambridge Smithing.....	3 25
Sonman Smithing.....	3 25
Grave Creek.....	3 40
Mountain County.....	2 00
Clinton Lamp.....	2 00
Sreator.....	2 00
Minork.....	2 00
Morris.....	2 00

CANNEL.	
Kanawha.....	4 50
Buckeye.....	4 25
COKE.	
Connellsville Coke.....	4 75@5 00
Crushed Coke.....	5 50
Charcoal, carload per bu.....	8½@8¾

To glue leather to iron paint the iron with some kind of lead-oxid, say white lead and lampblack. When dry, cover with a cement made as follows: Take the best glue, soak it in cold water till soft, then dissolve it in vinegar with a moderate heat, then add one-third of the bulk of white pine turpentine; thoroughly mix, and by means of the vinegar make it of the proper consistency to be spread with a brush, and apply it while hot; draw the leather on quickly, and press it tightly in place. If a pulley, draw the leather round tightly, lap and clamp.

THE POWER OF HOME.

How It Operates in Promoting Purest Patriotism and Most Earnest Labor.

One solution of the labor problem would be found in the more general ownership of homes. This healthful and conservative influence has already been happily felt in New England and widely over our land. The man who owns a homestead has given bonds to society for good behavior. The motto of the second president of the United States, John Adams, that "the ownership of land is essential to individual thrift and national strength and prosperity" he had long seen happily illustrated in his native state. There is protection and education in the ownership and especially in the love of home. Patriotism itself hinges on the domestic sentiments. When one's home, however humble, becomes the Eden of taste, and joy and love, those healthful localities are formed which bind him first and most to the spot he owns and improves, and then to his town, his state and his country. Whatever ennobles one's domestic life nurtures all the better elements of his nature. But the nomad, without local attachments, can have no genuine patriotism. As little content in one place as in another; and truly happy nowhere, he is like a tree planted in a tub, portable indeed, but at the expense of growth and strength. This is no new sentiment. More than two thousand years ago, the son of Sirach said: "Who will believe a man who has no house, and lodgeth wherever the night taketh him?" I have time to quote but few of the many practical illustrations of this subject.

In Switzerland, out of 455,000 households, 465,000 are householders. Here is one secret of the remarkable patriotism and prosperity of that people, and of their comparative exemption from labor troubles. Their excellent public schools, and twenty-nine industrial schools, all topped off by their grand polytechnic institute, at Zurich, including the same practical work as that of the Worcester industrial institute, have wonderfully unified the home-owning and home-loving people of those twenty-five cantons. Though separate in race, religion and language, they are one in national interest, proud of their history and prouder still of their recent progress and manufacturing prosperity. They are an ingenious and industrious people and their mechanics are educated and skillful, believing in the dignity of labor and the thorough mastery of some trade. Though hemmed in by mountains, without a seaport, with few minerals and no coal, with costly transportation, all freight from the seaboard coming over foreign territory, Switzerland threatens the ribbon trade of Ceventry, rivals the English and French in muslin and delaine, and the world in watches, music-boxes and wood-carving.

Philadelphia as the greatest workshop of America furnishes a striking illustration in point. Its comparative exemption from strikes is due to the fact that as a rule, the workman there owns his home. Hence he is as conservative as the capitalist. You may find scores of squares with nice brick houses of working men not one of which is a tenement house. Philadelphia now has double the number of dwelling houses of any other city of its size in the world. This marvelous increase in its home-lands is due to the co-operative building associations, numbering over four hundred. They have been tried for nearly fifty years and have proved such valuable forces in promoting industry, economy, sobriety, thrift and prosperity, that the state encourages them by exempting all their stock and mortgages from taxation. Though the holdings of these associations exceed \$50,000,000, they are managed by workmen at little expense and are always open to the public scrutiny. Failures have been very rare, less than in any other class of financial associations. The worst of those, closed during the panic of 1873, paid 93 cents on the dollar. These associations, so antique, tried so long and so successfully, are a model for the workingmen of the country, certainly in large manufacturing centres.

They have "no capital stock," or "stockholders," in the ordinary sense of these terms, and no discount business, being composed only of borrowers and depositors, representing labor in its weekly and monthly savings, struggling for a home and no capital for the purposes of profit. They are mutually beneficial associations and their members are generally engaged in manual labor, not one in twenty of whom has an income of a thousand dollars a year. Their chief aim is to encourage and help every member to create a home.

That I may speak authoritatively, I will epitomize certain statements kindly furnished me by an eminent Philadelphian, especially conversant with this subject, who says: "The tenement house is unknown here. In the riots of 1877 the 20,000 members of building associations acted as an efficient counterpoise to the lawless throngs that crowded the streets. The instinct of self preservation, of social order, was as strong with them as with the wealthier classes, and was even more effectual. It neutralized, in their own camp, the clamors of a vicious and riotous rabble, so that the presence of the mayor

and the police were sufficient to quell all disorder without collision. These associations have been a potent factor in making our people prosperous and moral, encouraging sobriety and preventing dissipation. The absence of any socialistic tendencies can undoubtedly be traced to the general ownership of homes."

There are model manufacturing establishments which are giving a practical solution of the labor problem, where the owners show such an interest in their hands as to secure their sympathy and co-operation. Such is the Fairbanks Company, of St. Johnsbury, Vt., employing in the factory, and branch departments elsewhere, over 1,000 and making over 60,000 scales annually. It has been in successful operation for over fifty years, and yet during this long period there never has been any conflict between the employer and employed, there have been no labor league or union, no strikes, no eight-hour movement, nor any desire expressed for any such change. The workmen are mostly Americans, intelligent and skillful, usually married, owing their homes, permanent residents, interested in the schools, the library, reading room and the liberal endowment Academy and other public improvements by the owners, who have always taken such an interest in their hands as to gain and retain their confidence and respect. It is not strange that their workmen hold on, many having continued in the service of this company from 15 to 40 years.

Did time permit, a description of the Willimantic thread and other kindred companies would fully illustrate this subject. Special mention should be made of the silk works of Cheney Brothers, at South Manchester, Ct., started fifty years ago, steadily growing and prospering and now the largest silk factory in the world. The Cheneys have long encouraged their hands to build and own their homes. To this end they sell the land cheap and loan money for building at low rate, but with a liquor reservation in the interest of temperance, and with the understanding that all houses shall be on a plan given or approved by their architect and painted some neutral tint. Not a house in glaring white offends the eye. The conditions of convenience, economy, taste and variety are happily combined, without once taking an enlarged dry goods box as a model. The result is a charming village of attractive cottages which stand apart and give an air of comfort and individuality to each. A fine lawn laid out with winding concrete walks, shrubs and flowers, fronts the mills and usually the houses. No fence or hedge separates the front yards from the streets. The beautiful grounds of the Cheney mansions, of the dwelling and of the factories, all present the appearance of one extended park and give a look of refinement, kindness and good neighborhood to the whole village.—R. G. Northrop.

RAILROAD INTERESTS.

The Trouble Over Coal Tolls From the Anthracite Fields. Rumors About Reading.

No date has yet been fixed for a meeting of the representatives of the coal-carrying roads to arrange local tolls on anthracite from Mauch Chunk and Schuylkill Haven. It is believed, however, that a meeting will be held this week. Although the Pennsylvania has not formally announced to the other companies what its position is, there is very little doubt that it will oppose an advance from the present figures. One of the officers of the company said lately:

"There have been a good many complaints about the higher prices asked for transporting anthracite coal as compared with bituminous. The rates for carrying hard coal are about double those charged for carrying soft coal, and this is claimed by many to be discriminating within the meaning of the term as used in the state Constitution. How can Pennsylvania railroad make the tolls still higher if discrimination is contrary to the Constitution of the state?"

It is presumed that this is the position the company will assume on this question. If it makes this plain at the meeting this week it is pretty certain that tolls will not be advanced. The Reading and Lehigh Valley representatives would not, it is thought, attempt to force a measure upon Pennsylvania railroad officials which was repulsive to their conscientious scruples. Viewed as a matter of expediency it is contended the trade would stand an advance in tolls of ten cents per ton, but it is very much doubted whether, when legal grounds are alleged, that the officials of the other roads would attempt to force the Pennsylvania representatives to violate their ideas of what was justifiable.

A Philadelphian gentleman who has business relations with the Baltimore and Ohio railroad said that after making all allowances for the discrimination clause in the Constitution, he feared the recent relations between the Baltimore and Ohio and the Reading had something to do with influencing Pennsylvania railroad officials. It is well known that the Pennsylvania has all along contended that in a settlement with the Reading the attitude of the latter in regard to the Baltimore and Ohio must also be considered. The Reading, however, has

insisted that the Schuylkill Valley differences should be dealt with independently of any relations it might have with other roads.

A few weeks ago the contract between the Jersey Central and Baltimore and Ohio, in which the Reading is also interested, was signed. No understanding has yet been reached between the Pennsylvania and the Reading in reference to this contract, and it is thought that no attempt will be made to settle the Schuylkill Valley troubles until the Reading is ready to discuss its relations with the Baltimore and Ohio. The Pennsylvania people want, it is believed, an understanding that will include all competitive territory in the Schuylkill Valley and out to which the Pennsylvania and the Reading or their allied lines have access. Under these circumstances it is not believed that tolls will be advanced or any other changes made in the situation in the Schuylkill Valley for some time.

HAYES' SQUIBS.

Their Merits Call for Another Factory to Supply the Demand.

The one great desideratum in the perilous life of a miner is a safe and reliable fuse or squib for the setting off of his blasts. Of all the mine casualties of the coal region, the greatest percentage and usually the most fatal are those which flow from premature blasts, or the "hanging fire" of a squib in a charged hole. Various patents have been taken out for the manufacture of a squib that could be depended on at all times to do its work with safety to the collier, but only in rare instances have they stood the test. Changes of weather, atmospheric influences, mine dampness or dryness, with various other causes have acted on them to their detriment and the users have suffered. One exception to the rule has been the "Hayes squib," manufactured by George Hayes, at Girardville. It is the outcome of a practical miner's careful study and most exacting experiments, resulting in the production of an article that comes as near perfection as it is possible to do. It has been received with so much favor that for months past the manufacturer's resources have been overtaxed to supply the demand. Mr. Hayes gives his own personal supervision to the making of the squibs, and to this fact is due the measure of reliability they have gained. So long as he is able to do this he fears no failure in their service. In his Girardville factory a large number of workers are employed, yet they cannot keep up with the market calls. To remedy this Mr. Hayes is about to open a branch factory at St. Clair, fitting it out in every respect co-equal with his present place, and guaranteeing the same excellence in its products. The success he has gained in his business has been well earned by Mr. Hayes and the HERALD congratulates him on its enjoyment.

Pittsburg.

From the American Manufacturer.

There has not been sufficient water in the Ohio since our last report to send out loaded coal vessels or bring back empty ones. Mining is still going on in the Monongahela Valley, but in a limited way. There is nothing new from the railway mines. Prices are without change:

PRICES AT PITTSBURGH.
River, wholesale, on board.....37 $\frac{1}{2}$ ¢ cts. per bushel.
Railroad.....47 $\frac{1}{2}$ ¢ cts. per bushel

AT CINCINNATI.
River wholesale, on board.....57 $\frac{1}{2}$ ¢ cts. per bushel.

AT LOUISVILLE.
River, wholesale, board.....57 $\frac{1}{2}$ ¢ cts. per bushel

AT NEW ORLEANS.
River, wholesale, on board.....25 $\frac{1}{2}$ ¢ cts. per bbl.

Bushels are rated among dealers here at 76 lb.—26 $\frac{1}{2}$ bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke—All features of the coal trade are substantially as last reported: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Robert B. Allen, the superintendent of the Coahuila mine syndicate, has complained to Consul Lynn of the constant and persistent annoyance inflicted upon the mining company by Mexican officers at Cuzturo Cienegas and San Pablo. It is represented that since the Cutting and Arruarez affairs the arrogance has been more constant and the ill treatment of Americans in that locality more oppressive. A great deal of American capital has been invested in those mines, and in others throughout Mexico and in various Mexican industries. These operations would be seriously retarded and their prosperity injuriously affected by aggressive official interference, which, in places remote from central government, might be readily induced by popular malevolence. If any general disposition should manifest itself on the part of the Mexican populations of mining districts to molest the Americans employed there and disturb the course of enterprises carried on by American skill and money, a powerful sentiment of indignant protest would be aroused in this country that would compel the administration to adopt active measures for the protection of American money and interests in the neighboring republic.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith. The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

Miscellaneous Questions and Answers.

Editor Mining Herald and Colliery Engineer.

Question 1.—What is a "breather" as used in mines?

Answer.—An apparatus invented by Mr. Floss, for the purpose of enabling persons to enter an impure atmosphere. It is intended for the use of explorers in mines after explosions, enabling them to penetrate for considerable distances into after-damp or other noxious gases. It consists of a mask and mouthpiece, knapsack, and an elastic bag or air-reservoir, and is charged with oxygen gas, which the wearer inhales and by an ingenious arrangement breathes over and over again, and can there by remain in gas for several hours at a time; a safety lamp on the same principle is used with the "breather." Figure 1 represents the form and mode of using the apparatus.

Fig. 1.

the form and mode of using the apparatus.

Ques. 2.—What kind of timber is meant by the term "cocker-sprag"?

Ans.—The "cocker-sprag" is a pair of short props used to secure the face of the coal seam when being mined or under-cut, to prevent it falling accidentally upon the miner while at work "holing" or

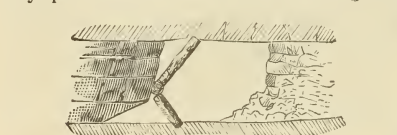


Fig. 2.

"undercutting." They are put against the coal in the manner shown in figure 2. They are mostly used in longwall, where the weight of the top is apt to break off the coal when partially undercut. When the "holing" is finished, they are knocked out and the coal taken down.

Ques. 3.—What is the meaning of the term "creep" in mining parlance?

Ans.—The term "creep" means that gradual movement and heaving of the bottom or floor of a mine caused by the weight of the overlying strata forcing the pillars into the softer bottom. The

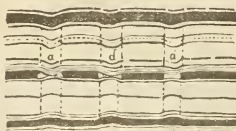


Fig. 3.

working away of a seam of coal will sometimes induce a "creep" in both an overlying and underlying if the distance between them is not great, especially where the area of the pillars is not in proportion to the depth from the surface. Fig. 3 illustrates the effect of a "creep" on three different seams, where the disturbance is caused by taking too much coal from the middle seam in the first mining, or in making the pillars too small.

Ques. 4.—What is known in mining as a "curry pit"?

Ans.—"Curry pit" is a term used in Leicestershire, England, and means a shallow pit sunk from an upper to a lower portion of a thick seam of coal, through which the return air passes from the stalls



Fig. 4.

to the airway for the escape of gas; the airway being carried parallel to the side of the stall, in some cases beneath the gob or goaf. Fig. 4 shows the plan of "curry pits" as applied to carry off the gas upwards into the return airway. It is the application of the ascensional principle in ventilation to clear the stalls of explosive gas.

Ques. 5.—What is the "detaching hook"?

Ans.—A self-acting mechanical contrivance for setting free the hoisting rope from the cage in case of accident from overwinding, or when the cage is drawn too high beyond the proper height in the shaft head derrick. When the cage is drawn above the proper place to stop, the rope is detached and the cage caught and held in the frame, thus preventing damage to the cage or machinery. There are many different forms and construction of "detaching hooks" in use. Fig. 5 represents a very efficient and much used form of "detaching hook." They are most valued as a safety appliance, by those interested in their manufacture.



Fig. 5.

Shenandoah, Pa., Sept. 8, 1886.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—Please publish the following answers to the questions given by "H." Drifton, Pa.

Question 1.—Assuming an airway 25 feet area, and 300 yards long passes 2,000 cubic feet of air per minute, what should be the area of another airway 400 yards long to pass the same quantity, all other things being the same?

Ans.—To make airways of different lengths of such area as to pass an equal quantity with the same pressure apportion them according to the formula:

$$a = \frac{q}{\sqrt{\frac{u}{ks}}}$$

To find the area of the airway 400 yards in length we will first find the power (u) for the airway 300 yards long and 25 feet area by the following formula:

$$\left\{ \frac{k s v^2}{a} \right\} \times q = u$$

Reckoning the perimeter to be the same in each case, we will take the length in feet as the rubbing surface; quantity divided by the area equal velocity:

$$\frac{q}{2150} \div 25 = 86 \text{ velocity.}$$

$$\frac{86^2 \times 900 \times \cdot 0000000217 \times s}{25} = \frac{u}{a} = 12.42217368.$$

Now we will try to find the area of the airway 400 yards long.

$$\frac{a}{\sqrt{\frac{12.42217368}{1200 \times \cdot 0000000217}}} = 78.1$$

velocity in the airway 400 yards long.

$$\frac{q}{2150} \div 78.1 = 27.5 \text{ area of the airway 400 yards long}$$

In a case like this, when the perimeter is the same in each case, all we have to do is to find the cube root of the rubbing surface thus;

$$\sqrt[3]{900} = 9.6548$$

$$\sqrt[3]{1200} = 10.6269.$$

Then as 9.6548 : 25 :: 10.6269 : 27.5 area the same as above.

Ques. 2.—An airway 600 yards long and 36 feet in area passes 3,000 cubic feet of air per minute; what quantity will pass through an airway 700 yards long and having 40 feet area?

Ans.—In trying to answer this question, I will take the airways to be square; first we have to find the pressure on the airway 600 yards long and 36 feet area:

$$\frac{a}{\sqrt{36}} = 6 \times 4 = 24 \text{ feet;}$$

$$\frac{24 \times 1800}{83.333} = 43,200 \text{ rubbing surface } \frac{q}{a} = 3,000 \div 36 = 83.333 \text{ velocity;}$$

$$\frac{83.333^2 \times 43,200 \times \cdot 0000000217}{36} = \cdot 1808318 \text{ pressure.}$$

To find the quantity that will pass through the airway 700 yards long and 40 feet area, under the same pressure, we will take the following formula:

$$\sqrt{\frac{Pa}{Ks}} \times a = q.$$

$$\frac{a}{\sqrt{40}} = 6.324 \times 4 = 25.296 \text{ perimeter}$$

$$\frac{25.296 \times 2100}{8} = 53121.6$$
$$\frac{p}{a} = \frac{1808318 \times 40}{53121.6 \times \cdot 0000000217} \times 40 = 3168 \text{ quantity}$$

that will pass in the airway 40 feet area.

Yours, &c.,

K. G.

Wants a Gauge.

Editor Mining Herald and Colliery Engineer:

SIR:—Where can I get a mercury gauge for testing steam and hydraulic gauges? What is the best steam engine indicator?

Yours, &c.,

J. W.

Wahoo, Neb., August 25, 1886.

A Triplet of Queries.

Editor Mining Herald and Colliery Engineer:

SIR:—What is the power of an engine 24"x55", running 400 revolutions, pressure 150 lbs? Is 400 revolutions the proper speed for such an engine? Can you furnish information as to size and construction of an oil-burning boiler for such an engine?

Yours, &c.,

V. M. B.

Oakland, Cal., August 30, 1886.

Suggesting a Plan.

Editor Mining Herald and Colliery Engineer.

SIR:—I think the following will interest "Pupil," of Shenandoah, who desires a person to post him for mine boss certificate examination. My plan would be as follows:

I should get a few of my friends interested and get them to subscribe for the MINING HERALD and get all books they could on mining. They should meet once a week, each member answering in writing all the questions that were in the last issue of the HERALD. Each member could propose one or more questions to be answered at the next meeting. Questions could be debated, and if not satisfactorily answered they could be referred for further information to the MINING HERALD. I have just given the outline of what I thought would be a good plan for those who are ambitious to advance themselves.

By organizing, one person will be found posted on the friction of air and composition and effects of gases; another can solve questions that involve mathematics; the third will be acquainted with the various methods of mining and timbering. Mine superintendents and bosses are almost always willing to help those persons that show an inclination for information.

Yours, &c.,

VOLOGONITE.

Pittston, Pa., Sept. 1, 1886.

Complimenting Mauchline.

Editor Mining Herald and Colliery Engineer:

SIR:—I think there is a mistake in the answer to question 4 in HERALD of Aug. 28. Should not the answer be 43.75? I hope Mr. Mauchline will soon have those articles published in book form. I think it will be the best book for American miners that can be had, as he treats of mining as carried on in the Anthracite region. I have read many books on mining, but most of them are either English or Scotch, which do not seem to treat of mining as it is done among us.

Respectfully yours,

I. E. J.

Pittston, Pa., Sept. 2, 1886.

Wants an Explanation.

Editor Mining Herald and Colliery Engineer:

SIR:—I see in looking over your issue of Aug. 28th that "Learner" discovers an error and asks to have it decided who is right. The question was by Robert Mauchline, in HERALD of July 31.

Two airways have each an area of 64 square feet, the same length 3,000 feet, one square, the other circular. Is there any difference in the rubbing surface? if so how much?

Circular airway,

$$\sqrt{\frac{64}{.7854}} = 9.02731 \times 31.416 \times 3000 = 85080.5.$$

Square airway,

$$8 \times 4 = 32 \times 3000 = 96000;$$

their difference by this formula would be 10919.5.

Now, in the "Mine Foreman's Pocket Book," I find on page 135 that $\sqrt{\text{area}} \times 1.2837$ will give the diameter of equal circle; so that by this we get

$$\sqrt{64} = 8 \times 1.2837 \times 31416 \times 3000 = 84105.2,$$

their difference being 11894.8.

As these results all differ, I also wish some one would explain.

Very truly yours,

TRAPPER.

Houtzdale, Pa., August 40, 1886.

IMPORTANT.

When you visit or leave New York City save Baggage, Expressage and \$3 Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot.

613 Elevator Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best. Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city.

Scientific.

An electric spark in a dusty atmosphere causes dust to settle, and if the air be smoky clears it. This is probably one reason why the air seems so clear after a thunderstorm, even if little rain has fallen.

It is familiar and yet it always strikes one as a marvelous fact that worlds may have been for years in existence, the light of which has not yet had time to reach our earth, and that we may continue to see the light of the stars that have been for a long time extinct.

The 600 tornadoes recorded show that their whirl is almost invariably in the same direction, opposite the hands of a watch; and their onward movement with us is nearly always northeastward. Their favorite time of day is known; and a tabulated list of 162 shows nearly two-thirds between 2 and 6 P. M.

An ingenious astronomical theory is that of Mr. Monck at Dublin, who suggests that as shooting stars are known to be dark bodies rendered luminous for a short time by rushing through our atmosphere, new stars are dark or faintly-luminous bodies which acquire a short-lived brilliancy by rushing through some of the gaseous masses visible, perhaps, as nebulae, which exist in space.

Fixed color standards are in demand for anthropological purposes. Those which were issued by Broca several years ago show a tendency to fade. Mr. Galton, looking about him for something more durable, has decided upon the imperishable enamel which is employed for Roman mosaic-work, and has recently visited the Vatican manufactory for the purpose of obtaining typical colors among its products.

Said to form the best polishing powder in use, and the cheapest: Sift the ashes and fill a pail one-third full with them; fill up with water, stir well, with one-quarter of a minute for coarse grade, one-half minute for medium, three-quarters of a minute for fine suitable for fine metals; then pour off the clear water and dry the sediment any way you please, in a bakepan on a stove, but not too quickly.

Investigations by Dr. R. Von Helmholtz, described to the Berlin Royal Society, confirm the statements that the formation of clouds in saturated air is induced solely by particles of dust, and that the finer and sparser are the dust particles the more slowly is the cloud formed. These results are also confirmatory of Prof. Tyndall's explanation that the blue color of the sky is due to floating dust.

An English patent: Instead of removing the scale or oxide of forgings by sweeping or scraping off, it is blown away by directing a jet or blast of steam obliquely upon the plate or bar as it passes into the rolls or when under the hammer. The scale is thus instantly blown off, and is thereby prevented from being rolled into the plate to the great injury of its surface. The same method may be adopted in rolling or forging iron or steel of any section.

A cement that will resist sulphuric acid, even at boiling heat, may be made by melting caoutchouc at a gentle heat, and stirring in from 6 to 8 per cent. of tallow. Then mix in enough dry slacked lime to make the whole the consistency of soft paste, after which add about 25 per cent. of red lead, which causes the mass to set hard and dry. A mixture of caoutchouc in twice its weight of linseed oil, and the addition of an equal amount of pipeclay, will form a paste that will resist the action of most acids.

The honey aunt is now sought as a delicacy by California epicures.

In a match against another juvenile, a Meadville boy ate six bananas in two minutes.

Preference of Cotton Seed Oil.

Cotton seed oil, a good housekeeper tells us, is better, purer and cheaper than either lard or butter. Its price varies with the price of lard, but it is always cheaper than lard. It makes fine rolls, biscuits, muffins, cornbread, gems, batter cakes, tea cakes and gingerbread. In some of these compounds it renders eggs necessary, and in others, where they are indispensable, lessens the number. As it boils at a lower degree of heat than the animal fats, it is pre-eminently fit for frying, and as the frying-pan, notwithstanding the anathema maranatha of the hygienists, continues to be the American escutcheon, it behooves us to use it wisely—not to burn our food in it. In a certain kitchen, where a belief in this oil is part of the culinary creed, fish, oysters and coquettes are fried to perfection in it. Saratoga chips and wafers emerge from their oil plunge the very poetry of potatoes—the golden morsels are crunched with thankfulness. Thus do its works praise it. Its humanity from burning is one of the strongest arguments in its behalf. The orthodox Jews, have, for well known sanitary reasons, never used lard. They will have only butter or olive oil. The Latin races have always been oil prodigals. They were the first converts to the cotton seed dispensation. In Southern Louisiana this oil is largely used for cooking, and in New Orleans every grocer keeps it, selling it under its own name to every housekeeper who values economy and purity of food stuff. Food prejudices are hard to conquer, and the more provincial a community, the stiff-necked they are in this respect. It is difficult to persuade them that other foods than the one used by their mothers and grandmothers are also palatable and wholesome. The best cotton seed oil is nearly colorless, tasteless and odorless, but when just delivered from the press, varies much in tint, smell and odor, and is filtered, clarified and deodorized by the manufacturers.

Horses in the West.

Horse growing is becoming one of the important industries of Montana. It is now where the cattle industry was ten years ago. Then the road to the Eastern market had only just been opened, and cattlemen were only just beginning to realize the importance of their occupation. Horsemen have only just now realized that they can market their stock profitably in the States, and are beginning to understand that the horse interest is liable to develop into one of scarcely less importance than cattle growing. They are not quite so sanguine as beef-growers were, for horses are not marketed for their flesh, but a few more years of success will allay their fears. The horse shipments of last year are estimated at 1,000 head, but when they reach 20,000 or 30,000, which will not be a great many years, things will look quite different. It must be remembered, also, that the quality of our horses will improve, and that, too, as rapidly as the numbers increase, and by the time our output reaches 10,000 head instead of 1,000, and 1,100-pound horses being the best, there will scarcely be an animal shipped that does not weigh above these figures. The horse interest of the Territory is moving rapidly along, and will increase in importance more rapidly than either sheep or cattle did at the dates referred to. The Montana horse will soon cut as important a figure in the industrial world as do our wool and cattle in the leading trade centres, and the horse growers will be growing wealthy quite as rapidly as any class in the Territory that is following any safe and legitimate calling.

Meteors and Volcanic Outbursts.

We have actually no possible way of explaining the terrestrial origin of any meteors but in volcanic outbursts. Moreover, we are obliged to set the time when such outbursts took place very far back in the past, seeing that at present the volcanic forces of the earth, even as manifested at Krakotoa recently, possess nothing like the power necessary for the election of matter beyond the range of the earth's back-drawing power. Looking, however, at the immense extrusive power of the tertiary era, when basaltic lava covering hundreds of thousands of square miles to a depth of 1,000 to 14,000 feet were poured forth, we can conceive the still mightier energies of volcanoes secondary era, their still more tremendous power in the primary era, and so, passing backward to millions of years beyond the first beginnings of life on the earth, we can even picture to ourselves volcanoes ejecting matter with velocities of 10 to 12 miles per second. With such velocities flights of ejected particles would pass beyond the earth's attraction, and if she were the only body in the universe, such ejected matter would travel away from her never to return. But, although such expelled bodies would never return to the earth, they would not escape from the solar system. To drive them forever away from her the earth would have to impart a much larger velocity—an average of about 26 miles per second. The greater number of the expelled bodies would travel thenceforth in an orbit round the sun, crossing the earth's track at or near the place where they were first sent forth from their parent planet. One may almost say that this origin of many meteorites and meteor systems is forced upon us by the evidence. Still it would be negative if we found that volcanoes do not eject matter at all resembling meteorites in structure. The reverse, however, is the case. Ranging the products of volcanic ejection in order according to the amount of iron they contain, and ranging meteorites in like manner, we find the two series coinciding over the greater portion of the longer—the volcanic series. We might not indeed have known how closely the most ferruginous volcanic products resemble the iron meteorites in structure but for the accident that Nordenskjöld discovered a mass which he mistook for an iron meteorite, but which is found now to be really a volcanic ejection, akin in structure to the field of basaltic lava (at Ovivak on the shores of Greenland), in the midst of which it had fallen while the lava was still plastic to retain this missile as it fell after its flight through many miles of air.

The Petroleum Industry.

Mr. Charles Marvin, one of the first to direct attention to the Russian petroleum fields at Baku, in speaking lately of the transference of petroleum in bulk, said that America was at present the principal petroleum power. By the development of the petroleum fields at Baku Russia had recently sprung into the position of the second petroleum power, and Mr. Marvin thought that England should come to the front and occupy the third position as soon as possible. By the annexation of King Thebaw's dominions she had come in possession of the Burmese petroleum fields, and he thought steps ought to be taken at once by the Indian government to survey these fields and so throw them open to British capital and enterprise. Within the last few years, since the extension of the railway, considerable petroleum deposits had been discovered in Beluchistan, but he regretted that the Indian government had decided to make them a crown monopoly. Still more recently petroleum

in abundance had been discovered in Egypt. Since he wrote in 1882 of the Caspian petroleum fields eighty steamers had been placed on that inland sea to carry oil in tanks from Baku to the mouth of the Volga, and on the Volga there were upward of a hundred vessels running. At present nearly all the petroleum arriving in Europe from America was brought in barrels; several steamers were, however, being constructed on the Tyne for the purpose of carrying petroleum in bulk.

Ice Water in Japan.

Although the Japanese never stored or used ice until the advent of foreigners, they have taken to the use of it since then with alacrity, and are as bad as Americans for drinking ice water. Men with portable stands slung over their shoulders perambulate the streets night and day, crying: "Kori! kori! kori!" (ice! ice! ice!) Their chief patrons are the jinnickisha men, who have most ready money and are spendthrifts by nature. The kori man, when called, sets down his stand, produces a lump of ice, shaves it as fine as snow over a plane. It is then mixed with sugar and sold at two or three rings (an eighth of a cent) a glass, to the panting jinnickisha men. This mixture, which they themselves apply call shiro uki (white stuff or snow), is not bad, and the newly arrived foreigner, when out of the sight of other foreigners, is not averse to indulging in it.

There is art in pride; a man might as soon learn a trade. Those who were not brought up to it seldom proved their craftmaster.

English Vegetables.

Many of the favorite vegetables in America are unknown to the English. In place of the succulent Lima bean they have in England a coarse sort of bean, in a broad flat pod, called "broad beans," only fit to be eaten when served with bacon. This season (I mean the beans, for bacon is an everlasting viand) is of short duration. At the best, broad beans are not regarded as an elegant article of diet. In place of summer squash they have a green, melon-like-looking vegetable called "vegetable marrow." It is a delicate vegetable, with a soft, pleasant aroma. String beans, or "scarlet runners," are plentiful, and English asparagus very delicious and cheap. The French asparagus is easy to buy, a few hours bringing it over to the London market. Even the nearest African ports bring a goodly showing of vegetables and fruits in their changing seasons. Peas are abundant, also tomatoes, potatoes, artichokes, French and English, the latter called Jerusalem artichokes, looking like white turnips. Gooseberries are big and red as crab apples, while figs, grapes, cherries and summer berries are not lacking. But they have no corn, no Lima beans, no oyster plant; and, alas! the peaches are mainly luxuries in florists' windows, selling often as high as half a crown apiece.

Those who have been once intoxicated with power, and have derived any kind of emolument from it, even though if but one year, never can willingly abandon it. They may be distressed in the midst of all their power, but they will never look for anything but power for relief.

Tattooing is, or has been, practiced in nearly all parts of the world. In the South Sea Islands elaborate patterns were wrought in youth over most of the body. An instrument of bone, toothed on the edges, is struck into the skin with a piece of wood, having first been dipped into a thick mixture made by rubbing down charcoal with a little water. The marks are permanent.

COLLIERY TRANSACTIONS.

WHAT IS GOOD, BAD AND INDIFFERENT IN COAL.

The Kohinoor colliery of the Philadelphia and Reading coal and iron company, at Shenandoah, Pa., has just put their large breaker in good working condition to prepare coal from the several beds attached to the mine, the Mammoth, Primrose, Holmes, Seven Foot, Skidmore and Buck Mountain, an aggregate thickness of some sixty feet of good White Ash coal. The colliery can produce 200,000 tons per annum.

The colliery on Big Mountain near Mt. Carmel, Pa., opened and operated by Reed, Stecker & Reed last year, and later purchased by H. P. Helwig, has been sold to William Taylor and W. J. Lloyd. The new firm have commenced improvement and soon will have a good supply of the excellent red ash coal for domestic consumption.

The fan house of the Lehigh and Wilkes-Barre coal company's breaker at Wanamie, Luzerne county, Pa., took fire one day last week and burned to the ground. The damage done was not very great as, owing to its situation, the fan house was all that suffered.

There has been a gang of men for some weeks past repairing the old breaker at Brookside colliery, near Tremont, Pa. It is now completed and ready for work. The new breaker, built about a year ago, is now working admirably. Last month there were 15,908 cars of coal tipped into this breaker, and it could readily prepare double the amount, and with the breaking power of the old one added to this new one, Brookside colliery at any time, if sufficient coal be furnished, has breaking power to prepare from 15,000 to 20,000 tons per week.

The Anthracite coal districts known as No. 1 Scranton, and No. 2 Pittston, have been re-arranged. Heretofore Mine Inspector Blewitt, of Scranton, had 70 collieries in his district, while Mine Inspector McDonald, of Pittston, had but 40. In order to equalize the production and territory, Old Fort township and all of Lackawanna territory southeast of Lackawanna have been taken from the Scranton district and placed in the Pittston. This will add seven more collieries to Mine Inspector McDonald's district. This arrangement was requested by the last examining board and was approved yesterday by the court. Mine Inspector McDonald's district now runs to the line at Taylorville.

Some controversy is going on at Wilkes-Barre, Pa., over large coal shipments in single days. At No. 5 breaker of the Susquehanna Coal Co. there were hoisted 1,340 mine cars or 2,800 tons on the 18th of August. The Nottingham breaker of the L & W. B. Co., on Sept. 28th, 1885, hoisted 1,301 cars which made a production of 2,920 tons.

What is represented to be the largest real estate transaction in Ohio for many years was consummated a week or two since, when 6,000 acres of Hocking Valley land were bought by a syndicate of capitalists for \$210,000. The tract includes 4,000 acres of virgin timber, not a tree on which has ever been touched by the woodman's axe. Underlying its surface are two seams of coal, one of which is seven feet in thickness, and the other from three to four feet. Fire clay and other valuable deposits are said to exist in the land.

The Wild Laubs.

MYSTERIOUS, Pa., Sept. 8.—A recent visitor here was through the Blue Ridge mountains where the party saw and conversed with a family of three people named Laub, who live in a mud hut and mingle in no way with the human family. Two elderly sisters are clad in heavy coarse clothing. The brother resembles a hermit. Their parents died some time ago. Benneville, Hannah and Mary are their names. They know nothing of current events. The original hut looks like a bake oven. Since the parents died the children have not slept in the abode but live in caves. Their beds are dried leaves and their food of the most simple kind.

COAL, COKE AND IRON.

WHAT IS OF RECENT INTEREST ON THE THREE GREAT MINERALS.

The Humane society's investigation of cruelty cases in the coke region did not reveal anything startling.

The iron trade is good in Pittsburgh and the number of puddling furnaces now in operation is larger than ever before known.

The Sheldon and Shafer mine, in Crystal Falls district, in the Lake Superior regions, is to deliver 10,000 tons of ore before the season closes.

The Colfax Coal and Mining Company has been organized at Colfax, McLean county, Ill.; capital stock, \$10,000.

The Beardstown Coal Mining Company has been organized at Beardstown, Ill.; capital stock, \$3,000; to prospect for coal, oil and gas.

On August 1st the Rodgers Coal Company and the Oswego Coal Company, of North Springfield, Mo., sold their entire property to the Kansas and Texas Coal Company.

Arrangements have been made for the erection of a test coke oven at the Williams coal mine about eight miles from Livingston, Gallatin county, Montana, which is building. Should the test prove successful, an indefinite number of ovens will be erected.

The working force at the Perkins mine, in the Lake Superior region, has been increased, and the Norway now employs 400 men, this being the largest force carried at that mine for some years.

Messrs. Barger & Payne, who had been working the Fiedler coal mine, near Boonville, Mo., recently sunk a shaft, and at a depth of 45 feet struck a seam of cannel coal into which they have worked to the depth of over 10 feet.

Eastern capitalists have engineers surveying through Washington, Perry, Williams, Johnson, and St. Clair counties, Illinois, a route for a new railroad from Belleville to valuable coal fields.

A number of men were sent to the Posey coal mines, in Pike county, Ind., that state, to clean off ground preparatory to the commencement of the building of coke ovens. The coal miners and saw mill employees refused to allow the men to go to work and they were compelled to return home after a fight had occurred.

The branch of the St. Louis, Iron Mountain and Southern railroads, which is building to the mine of the St. Louis Manganese Mining Company, in Arkansas, will be completed by the 15th inst. The mines are worked extensively, and large quantities of ore, amounting to several thousand tons, await transportation.

The Canada Anthracite Coal Company is pushing work energetically in its mines, known as the Cascades, Banfil, in the province of Manitoba, and it is probable that in a few months anthracite coal will be placed on the market in Winnipeg. Tests are making of it in the large consolidated engines used by the Canada Pacific railroad in the mountain, and a report will soon be available. Machinery for the full development of the mine is on the way.

READING'S FUTURE.

GENERAL MORTGAGE BONDS, NOT THE STOCK, TO CONTROL THE ROAD.

PHILADELPHIA, Sept. 8.—John Lowber Welsh denied the rumor published yesterday to the effect that he would contest with Mr. Gowen for the presidency of the Reading road. The same story was printed last week in another form, when it was said that the Morgan-Welsh syndicate would endeavor to secure control of the Reading company in the January elections. This was denied on authority at the time of its publication.

As a matter of fact, the syndicate has held all along that the general mortgages and not the stock must control the future of Reading. There is not the slightest sign that they have bought any stock either for control or other purposes. Dealings in Reading lately have been very light, although

it is known that some large blocks, one of 30,000 shares, have been purchased by one broker in the city. Before the next election it is not unlikely that the court will grant a decree in the present foreclosure suit.

A JOURNALISTIC PROJECT.

THE KNIGHTS OF LABOR TO ESTABLISH AN OFFICIAL ORGAN.

PHILADELPHIA, Pa., Sept. 7.—The following is a copy of a secret circular issued to Knights of Labor throughout the United States:

"NOBLE ORDER KNIGHTS OF AMERICA, OFFICE GRAND SECY-TREASURER, PHILADELPHIA, Aug. 23, 1886."

"To the Order wherever found, Greeting:—
At the special session of the General Assembly held in Cleveland, Ohio, May 25, 1886, the committee to whom was referred the proposition of instituting a public newspaper submitted the following recommendations, which were ordered to be sent to every local assembly for their action in the matter: That a public journal of the order is necessary, which shall be an exponent of the principles of the order; thoroughly educated in its relations to labor, non-partisan, and non-political."

"That not more than one-fourth of the space of the paper should be allotted to advertisements, and that these advertisements should be confined largely to concerns of a legitimate cooperative nature, and these advertisements should be printed on one side of the leaf only. That as the object of our aspirations is the attainment of justice, it is the opinion of the committee that the title of this public journal should express its scope, and we recommend the adoption of the name 'Equity' as its title, with a sub-title 'The Official Journal of United Labor.' That a per capita tax of fifty cents be levied on the membership of the order to absolutely guarantee a secure basis for the publication of the paper. That when the paid in subscription shall amount to the sum of \$100,000, the General Executive Board shall be authorized to proceed with the establishment of the newspaper, with a proficient editor and a sufficient number of able associates who should comprise the staff, and that the publication department shall be placed in the hands of a manager selected for ability—all to be appointed by the General Executive Board from members of the order—general supervision over the publication to be vested in the General Board." It is estimated that the running of the paper, at the present time, based on an ultimate circulation of 500,000 copies, would amount to \$250,000 per annum."

"The necessity for a public journal which will be an exponent of the principles of the order, and through which matters of public interest could be reviewed and attacks answered, is manifest to all members. You are therefore requested to take action on the following propositions and submit the result to this office: Shall the journal be issued weekly as a public newspaper? Shall it be by compulsory or voluntary subscription of members? Shall the subscription price be fifty cents or \$1 per annum? By order of the General Assembly."

FREDERICK TURNER,
General Secretary-Treasurer.

MINE ACCIDENTS.

CASUALTIES THAT MARK THE COURSE OF ANTHRACITE MINING.

Twenty-eight accidents were reported to Mine Inspector Williams as having occurred in the mines of the Wilkes-Barre, Pa., district during August. Five of these resulted fatally.

Vincent Pluz, a German, a water bailer, aged 58 years, was instantly killed Sunday by falling down the Hilstead shaft, near Pittston, Pa.

Joseph Gostock, a Hungarian, aged 22, was instantly killed Sept. 2, in Harry E. shaft, Wyoming Valley Coal Co., Pittston, Pa.

Thomas Perkins, a colored miner employed at the Stewart iron company's works, east of Uniontown, Pa., was fatally injured last Saturday.

During August there were eighteen accidents in the mines of the Pittston, Pa., district, Inspector McDonald. Four of them were fatal.

Prices for August.

The following colliers, drawn to return prices of coal, sold in August, to determine rate of wages to be paid for that month, make the following return of prices:

Wm Penn colliery, (Wm Penn Coal Co.) \$2.20
Otto colliery, (P. & R. C. & I. Co.) 2.25
Turley Run colliery, " 2.35
Knickerbocker colliery, " 2.35
Suffolk colliery, " 2.35

The average of these prices is \$2.35 4-10, and the rate of wages for August, 1886, is six (6) per cent. below \$2.50 basis; but the receivers, in conformity with the usual practice this year, will pay the full basis rate of \$2.50.

Suffocated by Coal Gas.

CHICAGO, September 8.—John Enright and his wife were found dead in their bed, at No. 430 Twenty-sixth street, to-day. They were married last Sunday. He was a laborer employed at the gas works. She was young and comely. They were last seen alive Monday night, when a number of their friends were at their home. When their door was broken open to-day they were found suffocated in their bed from the escaping gas from a coal stove.

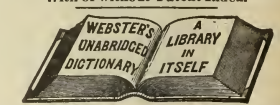
Parnell's Land Bill.

LONDON, Sept. 7.—Mr. Parnell has completed his land bill, which consists of only four clauses. He will introduce the bill on Thursday or Friday, and will endeavor to obtain a discussion of the measure before the debate on the estimates is finished, so as to be able to press it upon the Government for consideration.

The Daily News says that the Government will treat the rejection or acceptance of Mr. Parnell's bill as a vote of confidence or want of confidence in the Government.

WEBSTER

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12 miles from Philadelphia. Fixed price covers every expense, even books, etc. No extra charges. No incidental expenses. Examination for admission. Twelve experienced teachers, all men, and all graduates. Special opportunities are afforded to students rapidly. Special drill for dull and backward boys. Patrons or students may select any studies or choose the regular course for one year. Business, Classical or Civil Engineering course. Students fitted at Media Academy are now in Harvard, Yale, Princeton and ten other colleges. Number limited. 10 students sent to college in 1883, 15 in 1884, 10 in 1885, 10 in 1886. A graduating class every year in the commercial, scientific, physical and chemical Laboratory, Gymnasium and Ball Ground. 150 vols. added to Library in 1885. Physical and chemical apparatus. Free board in comfortable and a temperance charter which prohibits the sale of all intoxicating drinks. For new illustrations and circular address the Principal and Proprietor, SWITHIN C. SHORTLIDGE, A. M., (Harvard Graduate) Media, Penna. 184-ly.

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ANOTHER MINE HORROR.

Nanticoke's Sad Catastrophe Duplicated at the Marvine Shaft, Near Scranton.

While the terrible disaster at the Nanticoke mine is still fresh in the public mind, the weight of the sadness is increased by an almost equally calamitous occurrence at the Marvine colliery of the Delaware and Hudson canal company, Scranton, Pa. This took place between 9 and 10 o'clock on the morning of September 13th. Persons living in the vicinity of the mine were startled by a loud rumbling like the roar of distant thunder. The earth shook violently and great clouds of dust emerged from the mouth of the mine. The force of the shock was distinctly felt in the centre of the city and hundreds were soon hurrying to the pit, where about three hundred men and boys were at work. Superintendent B. B. Atherton immediately ordered a force of men with ambulances and stretchers to the mine. It was soon ascertained that the crash was caused by an extensive fall of rock. This wreck caused a fearful panic among the miners. The crash was preceded by a rush of air that coursed through the galleries and chambers with the force of a whirlwind, extinguishing the lights and leaving the men in total darkness. Then came the dread collapse. Those who were not caught in the wreck ran for their lives, stumbling among the debris. Most of the men, after a painful experience in which several of their number were injured, made their way out through the shaft.

The dead or missing are as follows: John Shafer, fifty years old; found dead; married. John Carden, thirty years old; married. John Young, fifty-five years old; married. Patrick McNulty; married. Cornack Maguire, fifty years old; married. Patrick Kavanaugh, forty-five years old; married. Patrick Murphy, twenty-five years old. Patrick Harrison, thirty-five years old; married.

In addition to these many of those who escaped were severely injured and tell of hairbreadth escapes. The search for the entombed men began at once with but little apparent hope of reaching them alive, as it is believed if they were living they would make their way out through some of the old workings with which the mine is connected.

Tuesday morning the air in the return air course showed gas to within two feet of the floor. Later in the day the gas was four feet from the floor, showing that it was diminishing in volume and that the speed at which the fans had been run was getting the better of the vast amount of gas set free by the fall, and which accumulated during the disarrangement of the air courses. This statement applies simply to the air-ways, and not the slope. Every exertion possible was put forward to find the missing men. President Olyphant, of the Delaware and Hudson canal company, telegraphed from New York to use every means possible to push forward the work of rescue. While it seemed almost impossible that the entombed men could be alive, still the search was prosecuted with all possible vigor in hope that they might yet be rescued.

Wednesday dispatches reported little progress made in the work of rescuing the imprisoned miners at the Marvine shaft. The boring through the pillar, where the coal was some twenty-three feet thick, was prosecuted with vigor that morning. The work was not long in effecting an entrance to the opening beyond. When this was done, however, it was found that instead of the air rushing in, as it had been hoped it would, the gas came out. As no possible good could be accomplished by further work at this point, it was abandoned and the work is now progressing at the first point where work was commenced and where the distance to be cut through is somewhat over 100 feet.

Some twenty-seven feet of this was cut Wednesday afternoon, and by Thursday morning half the distance was traveled. The creep has practically stopped, and the miners are fast losing their nervousness and apprehension. Three shifts are employed, as is usual where it is deemed best to hasten the work of driving headings on airways in mines. The shifts are of eight hours each, the men of each being divided into two gangs working each two hours at a time, they relieving each other. In this way the men are kept comparatively fresh at their work all the time.

At the point where the attempt is now being made to cut through into the chamber beyond it is not expected to meet any gas, as this entrance will be completely in the rear of the fall, and an opening once obtained can be used to establish an air course to either draw the air by suction or drive it forward, as the circumstances of the case may require. The mine, or cross-cut, now being driven is about six or eight feet, as small as could be conveniently carried through such a distance.

It can not possibly be finished before Saturday, probably not before Sunday. There is little hope now that any of the imprisoned men are alive. Crowds continue to visit the fatal mine, but the excitement has nearly disappeared.

Philadelphia.

Ledger.—The fall activity in the anthracite coal trade has begun, and will continue to improve from now until the end of the season. Generally the trade is in very good shape. The excess of production of anthracite this year over that of 1885, which a couple of months ago was over two million tons, is now less than one million tons. Accumulated stocks of coal at tidewater have been gradually reduced during the past month or two, until now they are below the normal condition. The unsalable sizes particularly have been worked off by making the prices attractive to buyers. The inquiry for the domestic sizes has improved considerably during the past week, and if the vexed question of tolls on anthracite to the line and city were only fixed without further delay the retail trade would become more spirited and dealers begin immediately to fill their yards with coal. Housekeepers have been returning from out of town in large numbers since the 1st instant, and are desirous of filling the coal bins before house cleaning, but as the question of tolls will to some extent affect the retailers' profit, they cannot bid for orders on an uncertain basis as to whether they will remain as they are, be advanced or reduced, and in consequence buyers hold back their orders. While prices are still shaded, say 10 to 20 cents off the circular figures, they are strengthening, and a further advance of 10 to 25 cents a ton is talked of, to go into effect on the 15th inst. The allotment committee of the anthracite companies will meet shortly to fix upon the quota of output of coal for October, when it is expected that 3,500,000 tons will be agreed upon as the probable market requirement of anthracite for that month. The third meeting of the toll agents of the coal carrying companies was held last week at the office of the Pennsylvania railroad, but nothing definite was done in the matter. The companies will assemble again this week and endeavor to reach a definite conclusion as to whether tolls shall continue until October 1st as they are now or be reduced, an advance being entirely out of the question. It is confidently hoped by the trade that something positive will result from the next meeting. The attitude of the Pennsylvania railroad on the toll question, it is said, can be, for the present at least, determined if the Reading railroad will agree not to carry Beech Creek bituminous coal, which, it is charged, it is now hauling for about four mills per ton per mile, a less figure than the Pennsylvania's full rate, which is about seven or eight mills per ton per mile. If the Reading company will agree upon that point with the Pennsylvania, then, it is claimed, the latter company will agree to permit the tolls on anthracite to remain as they are now until it shall have completed its Schuylkill Valley branch to New Boston. We are officially informed, however, that the Pennsylvania railroad's policy is opposed to carrying the same kind of fuel to New York for a less charge than is imposed upon Philadelphia, but that that company deems it proper to charge a higher rate for anthracite than it does for bituminous coal, because the former costs \$2 per ton to produce while the latter costs but 70 cents per ton, and that, being more valuable, in the event of its destruction from unavoidable causes the loss entailed is so much greater. The recent advance in prices of anthracite induced some Philadelphia shippers to canvass for orders for coal in Baltimore and other markets south of this city, but to those markets the Pennsylvania, it is alleged, advanced the rates of tolls to such figures that about two cents a ton profit was left for the shipper, so that they were compelled to desist from doing business there. It is believed by persons in the trade that the Pennsylvania knows where it can place all the anthracite coal it can get to carry when its new line is open. On Saturday the Reading company's total stock of all sizes of anthracite at Port Richmond was only 55,000 tons.

The total amount of Anthracite coal sent to market for the week ending September 4, as reported by the several carrying companies, was 565,510 tons, compared with 754,045 tons in the corresponding week last year, a decrease of 188,535 tons. The total amount of Anthracite mined thus far in the year 1886 is 20,312,39 tons, compared with 19,326,764 tons for the same period last year, an increase of 886,175 tons. The following statement gives the gross tonnage of each of the leading coal carrying companies for the week ending September 4, and for the year to same date, compared with the respective amounts carried to the same date last year:

Week	1886	1885	Difference
Reading R. R.	222,687	9,309,969	8,839,561
Lehigh Valley	116,825	4,670,066	4,320,429
D. L. and Western	82,616	3,199,787	2,971,215
Scranton	12,641	540,800	635,079
Del. and R. R. N. J.	25,500	1,069,550	1,101,574
Penn. Coal	36,550	1,299,662	833,263
Del. and R. R. N. J.	12,641	540,800	635,079
Pa. and N. Y.	36,336	1,328,812	1,105,231
Clearfield Pa.	55,457	1,207,842	1,956,440
Han and Wm.	9,541	346,648	412,794
Nor. and Wm.	10,954	562,387	381,998

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Sept. 4 was 270,590 tons of which 207,736 tons were coal and 62,854 tons coke. Of this weekly tonnage 202,988 tons originated on the main line of the Pennsylvania railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 9,978,989 tons of which 7,711,247 tons were coal and 2,267,742 coke.

These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending September 11, was 238,000 tons, of which 35,400 tons were sent to and 42,200 tons shipped from Port Richmond, and 32,000 tons were sent to and 35,000 tons shipped from Elizabethport. Vessels are reported in fair supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 85c. and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending Sept. 4 were 65,542 tons, and for the year to that date, 1,469,434 tons, a decrease of 364,135 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—Week, 50,881 tons; year, 1,151,261 tons; decrease, 184,475 tons. To Pennsylvania railroad—Week, 3523 tons; year, 175,148 tons; decrease, 101,080 tons. To Chesapeake and Ohio canal—Week, 11,140 tons; year, 142,926 tons; decrease, 78,580 tons.

Pittsburg.

From the American Manufacturer.

Concerning the river coal trade there is nothing new to report. The Ohio continues too low to permit the movement of either loaded or empty coal craft, and there are not enough empty vessels at the mines along the Monongahela to allow of active mining operations. In addition to this, it is a quiet season of the year—a season during which but little is expected or attempted. At the railway mines the situation is also about as it was a week ago. We continue to quote as follows:

PRICES AT PITTSBURG.

River, wholesale, on board..... $\frac{3}{4}$ @ $\frac{1}{4}$ cts. per bushel.
Railroad..... $\frac{1}{4}$ @ $\frac{1}{4}$ cts. per bushel

AT CINCINNATI.

River, wholesale, on board..... $\frac{5}{8}$ @ $\frac{1}{2}$ cts. per bushel.

AT LOUISVILLE.

River, wholesale, board..... $\frac{5}{8}$ @ $\frac{1}{2}$ cts. per bushel

AT NEW ORLEANS.

River, wholesale, on board..... $\frac{25}{26}$ @ $\frac{1}{2}$ cts. per bbl.

Bushels are rated among dealers here at 76 lb.—26 $\frac{1}{2}$ bushels make a ton of 2000 lbs., approximately.

The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke—The demand for coke continues heavy, and the established prices are well maintained. It is feared, however, by some of the operators that too many new ovens are being erected for the future good of the trade; Blast furnaces, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Another Labor Killer.

The Lehigh zinc and iron company is erecting a coal hoisting apparatus on the south bank of the Lehigh canal, Bethlehem, just above the L. & S. railroad bridge. The apparatus is the invention of J. M. Dodge and S. Price Wetherill. It consists of a derrick with a series of elevators and conveyers, and is designed for unloading coal from canal boats and cars and depositing the same on the stock pile or heap. The coal is conveyed to the pile without being handled, as it picks up the coal itself. In the usual bucket arrangements for unloading, the bucket has to be filled by shoveling the coal into it. In this the coal is merely shoved into the path of the elevators and is caught up when which projects over the boat and which has both a perpendicular and a lateral motion. On this arm the coal is carried back to another arm, which in turn conveys the coal to the stock pile. The whole thing is operated by steam. The coal is moved along the conveyors by means of an endless chain arrangement. This apparatus is the first one of the kind put into practical service. It will probably be patented by the inventors. It is a great improvement over the ordinary methods of unloading coal from canal boats.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Sept. 11, 1886.

	Week.	Year.
	Tons.	Tons
Shipped North.....	66,921-17	1,478,715-14
Shipped South.....	44,574-02	1,832,567-08
Total.....	111,495-19	3,311,283-08
For corresponding time last year.		
Shipped North.....	69,080-00	1,446,102-01
Shipped South.....	78,099-06	1,652,327-16
Total.....	127,189-06	3,098,429-17
Increase.....		212,853-06
Decrease.....	15,693-07	

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F. M. Co. Box 115, Newport, Ky.

Several years ago P. W. Shaefer and Calvin Pardee bought large tracts of land lying between Tremont and Pottsville, Pa. It is now said the purchase was made for the Pennsylvania railroad company.

AN IMPORTANT REPORT.

Mine Inspector Williams' Review of the Terrible Nanticoke Disaster.

Throughout mining circles at home and abroad all are familiar with the circumstances of the sad accident that occurred some months ago at No. 1 slope of the Susquehanna coal company's operations at Nanticoke, by which quite a number of lives were lost; of the efforts made to recover the bodies of the entombed miners, and how and why that work was abandoned. When this cessation of work in the direction of disintombing occurred, the relatives of the buried miners appealed to the governor asking that he use his efforts with the Susquehanna coal company to have the work still further continued. The governor communicated with the officials of the company, and inclosed a letter addressed to him by the attorney of the relatives, in which they petitioned the executive for assistance. It appears that the governor was in daily receipt of letters from bereaved parents begging him to move speedily, and one of the more recent of these epistles announced that if he did not act within eight days they would appeal to the president of the United States. A petition was forwarded by parents of the victims, who said that possibly some of the unfortunates were yet alive, but, "at any rate," they continued, "we wish them to be disinterred and buried in consecrated ground."

They charged that the company had not done its duty toward digging out the unfortunates, and besought the governor to induce the superintendent of the company to make the most strenuous efforts for the recovery of the bodies. They even alleged that the company, and especially the superintendent, showed an indifference which verged on heartlessness, and they stated that for seven weeks all efforts for the disintering of the bodies had ceased. They said that some men had volunteered their services for the purpose of continuing the diggings, but that the company had persistently rejected their offers and prevented them from carrying out their undertaking.

The governor has also received a special report on the mine disaster from G. M. Williams, the inspector of mines, giving a full history of the accident, the efforts made to rescue the imprisoned men while the impression was entertained that they were possibly living, and the work done toward recovering the bodies after it became evident that they were dead. It describes how on the morning of December 18, 1885, a large body of quicksand, saturated with water to such an extent that it flowed like a liquid, suddenly and unexpectedly broke into the mine of the Susquehanna coal company and washed through the workings, filling the main passage so rapidly that twenty-six persons failed to escape and were caught in it before they had time to leave their working places. This rushing mass had a head of 125 feet of water above it, and carried into the mine huge boulders, some of them as large as a flour barrel. This flow continued for one hour, and stopped on reaching the tunnel at the foot of the slope. Three thousand feet of the main gangway was completely filled with sand, and a tunnel half a mile away was packed with sand for a distance of 400 feet as tightly as if it had been pressed into brick. For four days it was thought that the men had only been closed in at an open space where the quicksand failed to reach them and possibly they might be living. But when the correct location of the cave-in was discovered those who were familiar with the mine claiming that the existence of a space sufficient to maintain the lives of so many persons for any length of time after the debris broke upon them was impossible. The main gangway had since been opened for a distance of 2220 feet, but none of the bodies had been recovered.

Inspector Williams says that in all the accidents that have occurred in the coal regions since the cave-in at No. 1 drift, at Carbondale, June 12, 1846, the bodies have invariably been restored to bereaved friends. At Carbondale forty acres of land caved in suddenly while all the men were at work in the mine, and fourteen persons were buried under it. The company kept men working for six weeks, and finally recovered eight bodies. Nothing like the Nanticoke disaster has ever caused such a calamity in that region, and the inspector concluded that before censuring any one all the circumstances should be considered and treated justly and without prejudice. He gives a detailed description of the mine, and tells how the rescuing party got within nineteen yards of the supposed location of the imprisoned men. He says they had got to the point of greatest danger when a large break occurred, and workmen were rescued with difficulty. Again they attempted to reach the buried miners, when a second break put the lives of seven men in imminent peril.

The opinion of the geologist in charge of the anthracite survey, Charles A. Ashburner, was requested upon the probable cause of the accident, and he attributed the peculiar formation which made such a break possible to a whirlpool in the preglacial

period in the buried valley of Newport creek. Some mining experts who were called in attributed it to a "pot hole," but all agreed that the mining was conducted in a proper manner, and that the company would not be justified in prosecuting the search.

The relatives of the imprisoned men were not satisfied with an abandonment at that time, so the matter of relief was intrusted to a committee of miners selected by the bereaved friends. This committee advised a relief borehole, which the company sank. It struck water at a depth of 140 feet in a 275 foot hole. This was on February 23, 1886. In March there was a meeting of the company's employees, and a committee appointed by that meeting reported that the plan of clearing the gangway was impracticable and unsafe. It proposed that the company tunnel for a distance of 100 feet and then resort to a borehole. On April 15 the tunnel had been driven to the water, and the large hole seventy or so ninety-three feet and the large hole seventy or so beyond, when water gushed out. The employees divided in their opinion; some wanted the tunnel carried further and some favored a bore-hole. But the officers of the company concluded that the lives of their workmen would be jeopardized by their further efforts in that direction, and on April 21st declined to go further.

The inspector says: "As long as work was continued with a view of rescuing the men or recovering their bodies it was done energetically and with the greatest possible dispatch consistent with the safety of the workmen. As to the practicability of recovering the bodies, the question is involved in so many uncertain conditions that it cannot be indubitably determined except by pushing the excavation forward, regardless of all perils, until it has either proved a success or a failure."

The inspector thinks a great column of debris is resting on the sand in the mine, ready to rush in as soon as the equilibrium is broken. "All the experts who have taken pains to examine the situation hesitate to advise a continuance of the search beyond the point reached. If the efforts should be renewed, no matter how it might be undertaken, extraordinary risks must be taken before the points where the bodies are supposed to be can be reached. Their remote position, the steep pitch of the breasts, the heavy grade of the counter gangway, the peculiar formation of the strata in that locality, the probability of the quicksand being saturated to almost a liquid condition, the great height of the debris resting upon that in the mine, and the depth and supply of water, and the gravel and sand above, should all be taken into consideration, because all are unfavorable to a successful ending if the efforts should be continued."

"The object of the Anthracite mine law of Pennsylvania, as represented in its title was to provide for the health and safety of persons employed in and about the Anthracite coal mines of Pennsylvania, and for the protection and preservation of property connected therewith, and evidently where there are no lives which might be saved it would be at variance with the spirit of the law to place the lives of workmen in unwarrantable peril. For this reason the mine inspector has deemed it his duty to refrain from advising continuance of work which might result in the loss of more lives when there is not the slightest reason to hope that the lives might be saved. As long as the work was in progress he visited the mine frequently and saw that every practicable precaution was taken to insure the safety of the workmen. The officers of the company complied with his suggestions promptly and willingly."

HAYES' SQUIBS.

Their Merits Call for Another Factory to Supply the Demand.

The one great desideratum in the perilous life of a miner is a safe and reliable fuse or squib for the setting off of his blasts. Of all the mine casualties of the coal region, the greatest percentage and usually the most fatal are those which flow from premature blasts, or the "hanging fire" of a squib in a charged hole. Various patents have been taken out for the manufacture of a squib that could be depended on at all times to do its work with safety to the collier, but only in rare instances have they stood the test. Changes of weather, atmospheric influences, mine dampness or dryness, with various other causes have acted on them to their detriment and the users have suffered. One exception to the rule has been the "Hayes squib," manufactured by George Hayes, at Girardville. It is the outcome of a practical miner's careful study and most exacting experiments, resulting in the production of an article that comes as near perfection as it is possible to do. It has been received with so much favor that for months past the manufacturer's resources have been overtaxed to supply the demand. Mr. Hayes gives his own personal supervision to the making of the squibs, and to this fact is due the measure of reliability they have gained. So long as he is able to do this he fears no failure in their service. In his Girardville factory a large number of workers are employed, yet they cannot keep up with the market calls. To remedy this Mr. Hayes is about to open a branch factory at St. Clair, fitting it out in every respect equal with his present place, and guaranteeing the same excellence in its products. The success he has gained in his business has been well earned by Mr. Hayes and the HERALD congratulates him on its enjoyment.

NEW ILLUMINANT.

Successful Experiments Toward Cheapening Natural Gas For Household Use.

An ingenious device for transforming natural gas into an illuminating gas, equal in every respect to the artificial product from coal, is on exhibition at No. 56 Wylie avenue, Pittsburg. The apparatus which is the invention of Josiah W. Ellis, a veteran inventor, consists of a miniature gas works. The natural gas in its raw state is introduced into peculiarly constructed furnaces containing retorts or decomposing chambers where it is freed from all impurities and in which it is entirely changed in its nature. From these chambers the gas passes through a multitude of carburetters and purifiers into a gasometer whence it passes through an ingeniously arranged device containing a freezing mixture for the purpose of testing its condensibility. The latter is a most important element in the economical and successful operation of a gas plant, for if the condensation could be avoided much trouble and expense would be saved. After weeks of trial Mr. Ellis is able to say that the gas made under his process will not condense as much as ordinary coal gas, that it gives off no noxious vapor in burning and no more heat than coal gas, but when escaping unburnt has a very perceptible odor, this odor being desirable in order to detect the presence of leaking gas in a house.

Mr. Ellis has been engaged for a considerable time in his experiment. He says that in trying to convert natural gas into an illuminant, many difficulties were encountered, heretofore considered impossible of removal. The existence of excessive heat giving elements and the almost entire absence of light giving qualities have been the stumbling block around which no one heretofore seems to have been able to travel. It is understood that the companies supplying it used a portion of coal gas to give it the essential element lacking as an illuminator. These efforts have proven failures, for it has been found that when natural gas in its raw state was brought in contact with any substance such as coal gas, or any element to give it illuminating power, no permanent combination took place, and consequently they soon separated, the natural gas, being the lightest, seeking the higher and other elements a lower level. Therefore where such a gas would be distributed throughout a city the inhabitants of the higher section would burn the lighter or natural gas and those of the lower the other or heavier elements of the mixture. Many efforts have also been made by individuals to use the gas in its raw state by running it through vessels containing benzine, gasoline, etc., but these necessitated constant attention and renewal, and owing to the volatile nature of the substances used amounted to but temporary expedients, and were generally soon abandoned.

It has been clearly shown that natural gas in its raw state has no chemical affinity for any other gas or substance that will lend to it the element lacking to give it illuminating power. This difficulty, as well as other obstacles, were long since determined by Mr. Ellis. The result of much experimenting on his part was the conclusion that under certain conditions this gas possesses a strong affinity for and under other conditions a strong repulsion for other substances, such as would give it the power of illumination. Having determined the condition in which the gas should be when brought in contact with other substances to give it illuminating power he has had constructed the apparatus already mentioned, and which does the work thoroughly. The gas has been examined by experts, and found to fulfill all the requirements of a first-class illuminant. Mr. Ellis does not propose to engage in the manufacture of natural gas into illuminating gas, but a company has been formed to work on his patent. All places lying within the boundaries of the natural gas development will be furnished with the new and cheap light should it prove all that the inventor claims for it. The process which has been perfected is such that the cost of the transformation of the natural gas into an illuminant of great strength, will be only five cents per thousand feet, exclusive of the cost of the natural fluid. As the natural gas is furnished for 10 cents per 1,000 feet, the total cost of a first illuminating gas will, therefore, be only 15 cents per thousand, or 55 cents cheaper than the gas now furnished.

Copies of the New Mine Law.

We had printed a large number of both the new Anthracite and Bituminous mine laws of this State for sale at this office, but we found the demand for them so large that both have already been completely exhausted. We therefore printed another and larger edition of each of the laws mentioned for those who desire them. They have been carefully read and compared with certified copies from the Governor. The price per copy of either the Anthracite or Bituminous law is only 10 cents. Not a single miner in the State can afford to be without the law affecting the region in which he resides.

MACHINERY'S INFLUENCE.

A Lightener of Man's Toil and an Aid to His Mental Elevation.

There are men still living, and some of them may be met with on the streets of Chicago today, who remember the time when the laboring classes were in a comparatively helpless condition. They lived poorly; were awkwardly clothed, their garments of the coarsest material, and were content with fare limited in quantity and meager in quality. In the sense in which we today understand popular education, it was then unknown. The time of which we speak does not extend back to a period over sixty-five or seventy years ago. The workman gained from the soil a scanty living, or toiled hard to produce it in ill-ventilated factories, aided by the rudest tools and devices; and when his fellow workers sought to enlighten his task by labor-saving machinery, he fought against them, precisely as some do today, and with his own hands strengthened his shackles and renewed his fealty to honest manual toil without the aid of any new-fangled machinery, which he regarded with suspicion, and did not care to understand. One of the peculiarities of those days, however, was that the laboring man did not fly off at a tangent and enter upon a strike. There were no combinations formed then, not in this country at least, to compel employers to advance wages, or to dictate to an employer what he should or should not do.

The laboring man and mechanic struggled upward slowly, and was convinced only after he was defeated. Argument did not make him give up his prejudices, but facts did. When it was shown to him that a cotton gin could clean more cotton and do it better than his own hands, he very reluctantly admitted the fact, but denied the general application of it. He fought every improvement in his condition, as he would have fought an enemy, and not until his generation and succeeding ones had passed away was he educated into the knowledge that machines could do more work, and do it better, than his hands. He regarded all labor-saving machines as so many enemies, eating up the bread of himself and his children, and crowding him out of the world, when the fact was, then, as now, that they are his truest benefactors; instead of depressing his condition, they elevate it; instead of decreasing the demand for his services, they increase it.

Directly and indirectly, in a hundred diverse yet directly traceable ways, machines have been the truest friends of the human race. Men lose sight of these facts in the whirl and bustle of life. They accuse the people of the locomotive in place of the stage coach, the steamer instead of the sailing vessel, the telegraph in lieu of the mail, the modern Winchester rifle as a substitute for the flint lock musket, and yet fail to see how greatly these inventions have added to the blessings we now enjoy. By the development of the industries of this country, and not through the efforts of politicians, America stands the leading nation on the earth. The advances made in the past twenty-five or thirty years are truly wonderful, even to the expert; and what must they be then to those whose vocations lie elsewhere, and who know little of what is taking place in our industries?

It is not possible to construct a complete sewing machine in a minute, or sixty in one hour; a watch every fifteen minutes, or less; three hundred watches in a day, complete in all their appointments. More important than this even is the fact that it is possible to construct a locomotive in a day. From the plans of the draughtsman to the execution of them by the workmen, every wheel, lever, valve, and rod may be constructed from the metal to the engine intact.

Every rivet may be driven in the boiler, every tube in the tube sheet, and from the smoke stack to the ash pan, a locomotive may be turned out in one working day, completely equipped, ready to do the work of a hundred horses. This is only possible by the use of machines, guided and controlled by human intelligence, by a close system of supervision, and accurate economy of time and force, and a thorough knowledge of business. As the number of machines annually produced, and the mechanical facilities for making them, are increased, statistics show that the number of workmen is always augmented. Machines do not supplant workmen, but create a demand for them. If a workman is taken away from one position, it is only to find employment in another contiguous one. The opponents of machinery may say that if machines had not been employed, more men would have been needed; but it is easy to see that the production would decrease, fewer machines would be made, and fewer men needed to make them; for it is the province of the machine to supplement man's labor, to elevate him, and to increase his earnings, instead of the reverse. A man with a pair of stocks and dies may cut, by hard labor and a low rate of wages, one hundred five-eighths of an inch bolts in one day; but give him a modern bolt-cutting machine, and he will cut four thousand bolts per day, and cut them better than with his hands alone.

The machine shop is one of the promoters of civilization. The arts of politicians are subordinate to

it. Without the aid given by machines, their schemes would fall dead; without the locomotive and printing press, and the telegraph, they could not reach the ears of men in certain lines of thought. The ability to design a machine that will execute with automatic precision any given form requires a special development of brain power, and this development is by no means confined to the operator, but is shared by many persons. One machine leads to another, and as a consequence the intelligence of men turning out machinery of a high class is very marked, although they are unknown, for the most part, except locally. The machinist speaks through the work of his hand and brain. He adds to the population of the world when he sends forth a machine capable of increasing its working force; he frees his fellows from the bondage of mere handwork, and sets them higher problems to solve. In every way he advances the cause of his race, and leaves the world richer by his labors.—*Western Manufacturer.*

Protection in Germany.

Our English contemporaries are extracting a great deal of satisfaction from the fact that thirty German chambers of commerce have recently expressed themselves in favor of the abandonment of the protectionist system. The cause of the action of these German commercial bodies is briefly expressed in a statement of the Darmstadt chamber. Its report says: "Our economical relations with foreign nations are by no means favorable. The protectionist policy is proving more and more damaging to our industries, because other countries adopt retaliatory measures in order to combat the higher duties introduced by Germany. We think, therefore, that in the present condition of our industry it is most desirable that this struggle, provoked by our protectionist system, should come to an end, and give way to that of commercial reciprocity. The action of these chambers has but little to do, one way or another, with the question of protection, or their experience with its success or failure. In the very nature of things, which are engaged in foreign trade would oppose protection, which in its very essence is an attempt to destroy a portion of that foreign trade. The object of protection is to keep trade at home, not to increase foreign trade, so that the action of these chambers of commerce is just what would be expected. The vital question in connection with protection is not what bodies that depend upon foreign commerce think or the policy that restricts that commerce, but what has been the effect of protection upon those whom it was intended to benefit—the manufacturers and workmen of Germany. The evidence in these cases, so far as has been published, is decidedly in favor of the continuance of the protectionist system. The protection is benefiting the manufacturers and workmen of Germany is evident from the latest reports of the condition of the iron and coal trades of that country as compared with the condition of similar industries in Great Britain—a free trade country. German reports show a constantly increasing production of coal and coke, and while orders are somewhat scarce in the iron works, there is by no means that depression or that idleness of works that is evident all over Great Britain. It occurs to us that the reason why our English friends are so anxious for a removal of protective duties in Germany is not to increase the output of German works, but that of their own.—*Pittsburg Manufacturer.*

In Russia there are 33 railroad schools intended for the instruction of employes above lower grades, such as enginemen and roadmasters. These were first established in 1869, and until this year they were conducted by the railroad companies under state supervision, but they have become government schools under the direction of the minister of transportation. The course lasts three years; beginners must be between the ages of 14 and 17 years, sons of railroad employes preferred. The studies in the course are religion, elementary mathematics, practical accounts, surveying, principles of physics, telegraphy, the theoretical and applied mechanics, the elementary principles of engineering, railroad construction and operation, drawing, writing, practice in the machinists', smiths' and cabinet-making trades, singing and gymnastics. A certificate that the student has finished the course creditably gives the holder the preference for appointment in railroad service and relieves him from some of the obligatory military service. The cost of the schools is paid partly by tuition fees, partly by assessments on railroad companies, and partly by the government.

In Great Britain they have in various districts mining accident funds, which are devoted to the relief of those injured in mines, or the widows of those killed. At some places these funds have increased largely. The Hartley colliery fund, for instance, now amounts to about \$100,000. A scheme is now being considered for centralizing mining accident funds by a committee. Before a disposition of the money can be made, the scheme will have to be submitted by the various colliery districts, which will enable the home secretary to make a just and equitable division. To centralize these funds and enable the home secretary to make a reliable relief fund which they can bring before the home secretary to secure a portion of the surplus, it is now proposed to establish a permanent miners' relief fund. All surplus funds could then be added to the miners' accident fund and invested in the names of trustees. Both employers and colliers are expected to contribute to these funds.

Description of the Suto Tunnel.

This great work is frequently talked of in a most ignorant way, writes a correspondent about the Suto tunnel: It is a huge tunnel that has been run under the mountains to tap the famous Comstock mines of Virginia City, Nev., and afford a sluiceway and escape for the floods of hot water with which the deep, lower levels of these mines are deluged. The temperature of the water is 155 degrees and 12,000 tons, or 3,000,000 gallons, are carried through the tunnel every twenty-four hours. The tunnel is four miles long; and the water is conducted through it by means of a closed pine flume, thus confining the immense masses of vapor that would arise from so vast a body of water. When the water leaves the tunnel it has lost but 7 degrees of heat, and is utilized, for mechanical purposes by the tunnel company; after use being conducted through a second water-way tunnel 1,100 feet long, and thence flowing a distance of one mile and a half and emptying into the Carson river. The useful qualities of this vast stream of hot water are great and have been recognized by the dwellers along its course. In one instance dams have been built, forming pools, in which men and boys have the advantage of hot water baths. It is used also for the purposes of a laundry, and a tract of 1,000 acres belonging to the tunnel company is irrigated by it. In addition there is a plan on foot to lead the water with iron pipes laid under the surface of the earth and passing near the roots of thousands of fruit trees, and also to make it further subservient to man's benefit by supplying artificial heat to hot houses, in which early fruit and vegetables can thus be brought to maturity.—*New York News.*

Power and Diameters.

It has been stated somewhere in print that it will take about eight times the power to drive a two-inch shaft that it will require to keep a one-inch shaft in motion, both to be driven with the same velocity and it has set a number of mechanics to thinking it over with the conclusion that four times the power for a two inch shaft over one of half this size would be about right. Most of them take into account only the weight to get at the friction of a shaft which, no doubt, is a proper way of managing, but it will not do to leave the result right here without taking into account the space that the resistance has been carried through. Others consider friction as identical with power and if one is easily determined the other is known and it is a wonder that they get as great a result as they do. When the diameter of a shaft has been made twice as large as before, without changing its length, its weight has been increased four times, and the friction from this cause has increased accordingly, and if we were to stop here, thinking that there is no change to be made in the amount of power, we should find it difficult to reach the figure that is fully twice this amount. But the friction is no longer to be found on the surface of the one-inch shaft; it is removed to a greater distance from the centre. The force to drive the shaft when the pulleys and belts have been removed, not only has four times the load to carry when the shaft has been made twice as large, but must drive it twice the distance to keep up the same speed. Friction is found at the surface of the shaft, and is holding back with a resistance equal to the driving force when taken at the same distance from the central line of the shaft. This driving force may be four times as great for a two-inch shaft than that required for a one inch shaft, but when taken at equal distances from the centre, as a sort of a crank arm to drive with, the strain on this figurative crank pin will be doubled on account of its leverage, leaving one eight times as large as the other.

A new sewing machine, a German invention, is being brought out that weighs less than 16 oz., and which can be supplied to the public, according to one of the English journals, at the cost of a few shillings. The machine is called the "Moldaoot." It has neither wheels or treadles, being worked by the right hand, while the left is free for guidance of the material to be operated upon. It is simple in construction, and for ordinary domestic purposes it may be depended upon, it is said, to do the class of work now performed by the manufactures of American origin. It is what is termed "lockstitch," and can be sewed to the leaf of any ordinary table. It can be packed in a little box 8 in. long by 2 in. wide and 2 in. deep.

SAFETY LAMPS FREE.

Every mine boss should possess a good safety lamp, even if the mine does not give off fire-damp. There is no telling when it will make its appearance, and a safety lamp may be wanted at any moment for purposes of investigation. Any person sending us five new yearly subscribers and the money for the same, can have Williams' improved safety lamp, or the Boss' pocket safety lamp sent free.

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-AT-

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FOR THE WEEK ENDING

SATURDAY, SEPTEMBER 18, 1886.

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THE TRADE OUTLOOK.

Improvement in business prospects and a moderate increase in the volume of trade still continue to be the chief features of the business situation. A slight decline in the price of some products is noted during the past week, but this is due not to lack of demand but to reports showing the yield to be better than was promised earlier in the season. Wheat, corn and oats have all declined in price in consequence of the September report of the agricultural bureau, showing that the yield will be much better than earlier reports indicated. Other products however, are generally firm and in good demand, and a few have shown a slight tendency to advance, but mostly as the result of speculation.

The financial outlook continues to improve and all fears of an embarrassing monetary stringency appears to have vanished. The banks are generally increasing their reserve and the treasury is gaining nearly a million a day, the receipts being nearly that much in excess of disbursements. A singular feature connected with this is the fact that last week the payments in gold certificates, which amounted to only 16.6 per cent. of the whole in the month of August, have advanced to 55.1 per cent. up to the close of last week. The significance of this fact is the entire absence which it implies of the danger of the disappearance of gold by reason of the continued coinage of silver. Silver bullion is now so low that trade dollars are quoted at 70 cents, but this in no way affects the currency of the country. The Bland dollar is a legal tender, and no matter to what point the bullion contained in it may fall it will continue to perform its function as money equally as acceptably as gold. The accumulation of money in the treasury has prompted another bond call, and the demand for currency to move the crops being about supplied, it is believed that abundant money for all the requirements of the fall trade can now be had.

Railroad earnings continue to show a slight but positive increase over last year, and as a consequence stocks are advancing with commendable regularity. While the negotiations of western railroads have not reached a final settlement, there is believed to be substantial progress made, though it must be admitted that no adequate provision yet appears for the adjustment of the difficulties arising out of the building of so many rival lines. The present grain traffic, however, is large enough to give each of the companies a fair share of patronage, so that there is little disposition at present to indulge in any throat-cutting. The statements of forty-four roads throughout the country for August show earnings \$17,984,688, against \$15,557,000 in August, '85, and \$16,062,909 in '84. For the eight months from January to August, inclusive, the earnings of the same roads this year are \$122,035,529, against \$116,557,216 in '85, and \$120,049,578 in '84. In other words, the increase in the earnings of the current year up to September 1, over the same period of last year, is two and one-half times the increase over the corresponding period of '84.

The business failures reported in the United States last week numbered 152, against 173 the week previous, 183 for the corresponding week in '85, 180 in '84, 136 in '83 and 121 in '82. Canada had 22, against 27 the previous week, and 21 in '85. The total in the United States this year to September 10, is 7,004, against 8,045 in a like period in '85.

The coal and iron industries continue prosperous and a hopeful feeling is reported from the chief centres of both industries. The inquiry for crude iron has not increased perceptibly during the past two weeks, but this creates no alarm or uneasy feeling. Production is heavy, but few furnaces are troubled with stocks and many have large orders booked ahead. Mills and furnaces throughout the west are booking sixty and ninety day orders, and some mills in Pennsylvania and Ohio are sold up to their capacity for three months to come. Southern iron is being offered in eastern and western markets, but only at full prices. The demand for plate, sheet, tank and bridge iron is sufficient to keep the mills well employed, but not active enough to cause an advance in prices.

The Anthracite coal trade is represented in all quarters to be in good condition, and this is reflected in the advance in prices agreed upon by the producers, in New York, on Tuesday of this week. Stocks at tidewater shipping points have been greatly reduced, and the recent advances ordered have strengthened the market. The fall season has opened with a good demand that promises to con-

tinue during the next three months. Shipments to the south and west are greatly in excess of what they usually are at this time of year, indicating low stocks and increased demand at these points. There is also a good inquiry from the east. Orders that were withheld in expectation of further reduction in prices are coming into the market, and the distribution of the different sizes is more general than for some time past. Manufacturers having experienced an improved business are making a larger demand for the sizes they use, and this, in connection with the activity in domestic coals, places the trade in a better position than for some time. The bituminous trade is also experiencing an increased demand and the output at present is larger than at any time since last winter.

THERE is a very fair trade reported in Anthracite at the centres of trade, and with anything like a continuance of proper business management, the next two months should be very active ones in this industry. It will be wise not to rush the tonnage for October to any great figure. The sales agents met yesterday and it was agreed to make another advance in the tide-water prices, and we quote at N. Y. ports, broken, \$3.50; egg, \$3.70; stove, \$4.00; chestnut, \$3.55; pea, \$2.10. The next meeting is to be held on the thirtieth. Lehigh coal is scarce and firmly held by all shippers—some uncertainty as to labor in this district makes sellers very cautious in entering orders for future delivery. So far as the general trade is concerned, it is good, although Boston claims to have plenty of coal to fill orders and does not believe in the higher prices. Philadelphia is now reporting a good demand for coal and very short stocks to draw from. We have a very bullish report from Chicago, and at all the interior ports there seems to be an excellent business doing, and the prices agreed upon are said to be quite firmly held to. Bituminous steam coal jobbers are reporting more inquiry for coal and it does seem that there is more activity—which cannot be solely due to the filling of contract business. It is not unreasonable to suppose that as the rates for anthracite are advanced, the demand for soft coal will increase—unless the operators, dealers and jobbers therein take note of this advance and also ask more for the commodity they deal in. Some effort is said to be making to have the prices more remunerative, but there does not appear to be that unanimity among the soft coal men so desirable to bring about this result. Locally trade is fair, at say \$3.25 alongside for the best coal. Cincinnati reports the receipts of coal by river about suspended on account of low water and the stock of coal is only fair. Cleveland operators do not seem to take much stock in the idea of the national federation being able to control the question of wages. Pittsburgh reports trade about as it was a week ago; the river shipments to Cincinnati and Louisville this season have footed some fifty-six million bushels as against sixty-four million bushels in last season. At Boston bituminous coal is dull at \$2.10 @ \$2.15 f. o. b. at the loading ports. Provincial culm coal is to be had at \$2.30 delivered but only a limited quantity can be placed. The usual tonnages are appended:

	Week.	1886.	Week.	1885.
Cumberland.....	70,000	1,539,434	65,098	1,899,587
Clearfield.....	49,340	1,156,198	46,780	1,203,523
Broad Top.....	7,109	263,806	2,633	106,906
Poconong.....	20,000	582,387	11,514	394,615
Beech Creek.....	25,000	683,424	14,983	514,648
Chester & Ohio.....	35,000	826,263	22,069	834,209

In the Connellsville coking coal district, the operators have acted wisely in keeping their product in check, so that they do not overstock the market—at the same time this action tends to keep the ambitious spirits who would extend facilities for production in check. At present the ovens run but five days in the week and there is no change in the prices—firm at \$1.50 per ton at the ovens. The outlook for the fall trade is said to be very good indeed, and the syndicate intend that the realization shall be up to the expectancy.—Saward's Coal Trade.

In the Hazleton region scarcity of cars compelled the breakers to work three-quarter time even in the first days of the month, when work was presumed to be full. There are various ways of restricting production.

CUT-THROAT competition in the operation of bituminous coal mines and among the dealers is knocking the life out of the markets for that branch of industry. Natural gas, electricity and mining machinery also act as auxiliaries of demoralization

PENNSYLVANIA AND READING.

Considerable interest is beginning to attach to the position taken by the Pennsylvania railroad with regard to tolls on anthracite coal. The Schuylkill valley branch of the Pennsylvania railroad, which penetrates into the very heart of the Schuylkill coal field, is almost complete, and it is known that the company is averse to advancing freights beyond the present figure charged by the Philadelphia and Reading, and even hinted that when the road is put in operation a large reduction on these rates will be made for the purpose of obtaining traffic from individual operations whose tonnage is now given to the Reading. The inducements held out for such action, among other things, are said to include the guarantee of a market by the Pennsylvania for the output of such collieries as shall transfer their tonnage from the old to the new road.

The extent, however, to which the Pennsylvania can injure the Reading in this way seems to be greatly exaggerated. It is true the Schuylkill Valley branch promises to become a competing line, but it is not entirely clear where the new branch is to obtain its tonnage. The proportion of the Reading's coal tonnage now obtained from individual operators in the Schuylkill region is so small as to be almost insignificant, and most of it is obtained from points which the Pennsylvania could not conveniently reach. The bulk of its tonnage is mined by the P. & R. C. & I. Co., from its own lauds, and these the Pennsylvania cannot hope to reach without a revolution occurs.

But the manner in which the fortunes of the Reading are supposed to be affected is not so much by the loss of traffic as by the reduction in tolls. It is well to remember, however, as above stated, that the coal carried by the Reading is nearly all mined by the P. & R. C. & I. Co., and that if freights are reduced to a dollar a ton it will but charge the fifty cents from one account to another. The railroad's loss is the coal and iron company's gain, and they being but two branches of the same corporation, there can be no loss in the transaction.

The Pennsylvania is certainly not yet in a position to damage the Reading to any great extent, and there seems to be little reason to apprehend any serious trouble between them. The Reading can well afford to carry coal out of Schuylkill county as cheaply as any other road, and all things being equal could, perhaps, carry it a trifle cheaper.

A new and valuable use for Anthracite coal has just been discovered by a Jersey experiment. If it shall realize all the anticipations of its discoverers, a great advantage will accrue to potteries where no inconsiderable market will be newly opened for the diamonds. For this new find-out we are indebted to W. C. Hendrickson, a Trenton potter, who has successfully fired one of his firm's decorating kilns with gas made from Anthracite coal by a newly discovered process with which the firm have been experimenting for the last two months. Heretofore wood has been used and its cost has formed a considerable item in the expense of firing a kiln of ware. Mr. Hendrickson said that the results were entirely satisfactory. The gas is made at an expense but little in excess of the cost of natural gas to the East Liverpool potters, and he thinks its cost may be reduced still lower when experience shall have improved the new process. It will cheapen the cost of kiln firing at least one-half, Mr. Hendrickson thinks. The discovery he regards as one of great importance to manufacturing potters, and it is probable that it will be soon adopted by all the potters in this part of the country.

DRIFTON, Luzerne county, Pa., is about to have its miners' and mechanics' industrial school reopened. The technical education that could be imparted by that institution would be of great value in the industrial development of the region and eventually of the state, but it can only be realized by placing in charge educators trained in the practical and theoretical knowledge of American mines and mechanical methods. Foreign instructors are not suited to the case, and unless they are given the go-by, the institution will fail to realize a complete success.

DESPITE the gloomy condition in which Henry George pictures the Anthracite miners as living, he is coming here to lecture in hope of making a financial stake. All these reformers have a like love for the almighty dollar.

FAILED UNDER TEST.

Dangerous Defects and Influences of the Celebrated Davy Safety Lamp.

The beneficent character of Sir Humphrey Davy's famous lamp has so long been an article of faith with most Englishmen, says *The London Standard*, that the majority will observe with pain that evidence appears to be accumulating tending seriously to its discredit. For a long time past its repute with scientific men appears to have been greatly impaired, and, as most people are aware, its popularity with miners is today by no means what it was for many years after its introduction.

Davy's lamp dates from the memorable year of Waterloo—1815; and though the inventor's claim to priority, as in the case with most inventive successes, has been disputed, he certainly got the credit for a new idea at the time. We do not propose to discuss the point here; but it may be observed in passing that George Stephenson is said to have had a lamp on Davy's principle actually at work at the time that the great chemist was experimenting his way to the construction of that with which his name has been identified. However this be, Davy's was undoubtedly a genuine invention, and he certainly got the credit, not only for the lamp, but for a disinterested magnanimity which has often characterized the best of our scientific men. It has been recorded that a friend remonstrated with him on his neglect to patent the idea of his lamp. "You might as well," said he, "have secured this invention by a patent and have received your five or ten thousand a year from it." "No, my good friend," replied Davy, "I never thought of such a thing. My sole object was to serve the cause of humanity; and if I have succeeded I am amply rewarded in the gratifying reflection of having done so." One may readily believe that this was genuine sentiment, although it may be true that if Stephenson had already embodied the principle in a lamp of his own, Davy, of course, could not have patented it. In one respect it is very much to be wished that somebody had done so, for whatever may be the merits or demerits of a genuine, well constructed "Davy," it is beyond question that a vast number of spurious, ill-constructed lamps have from time to time been foisted on the mining market; and many a terrible disaster must have been occasioned by reliance on "safety" lamps which could really afford no protection at all.

The idea of the Davy safety lamp is very simple, and is generally understood. Fire-damp is fortunately the least inflammable of all the known inflammable gases. It requires a higher temperature to ignite it than any others. This characteristic is illustrated strikingly by the fact that when Sir Humphrey Davy began his investigation into the subject he found that the commonest mode of lighting a fiery mine was by a machine which threw off a stream of brilliant sparks from flint and steel. Such a stream would inevitably have exploded any other of the inflammable gases. The same would have been the case with the pans, or glowing charcoals which were also used for lighting chimneys in places where they dare not employ candles. But neither the brilliant sparks or the red-hot charcoal were sufficient to kindle the dreaded fire-damp. The flame of a lamp would do it, but the temperature of even a flame required to be reduced only a little, and it would fail to explode the gas. Davy found that this reduction could be effected by the interposition of wire gauze. The gases constituting a flame could not pass through a gauze of fine wire without being so far cooled as to be incapable of inflaming ever so dangerous a body of gas on the other side of the gauze. That, as most persons are no doubt aware, is the simple secret of the safety lamp, and it would be mere folly to deny, as many persons are now disposed to do, that this beautifully simple idea as embodied in Davy's lamp—and, it should be remembered in all sorts of modifications of it, many of which Davy would certainly have condemned—has been the means of preventing innumerable disasters and saving countless lives. For many reasons colliers were better able to judge of its worth in the early years of the invention than we are now, and the testimony to it was at one time exceedingly strong. "It is now," said Mr. Lambton, afterward Earl of Durham, who presided at a banquet given to Sir Humphrey Davy at Newcastle in October, 1817, "nearly two years that your safety lamp has been used by hundreds of men, as many persons are reassured of the earth and under the most trying circumstances. Not a single failure has occurred; its absolute security is demonstrated."

That, indeed, was going considerably beyond what Davy would himself have claimed for his lamp. Nothing could be more explicit than his own statements as to the limits of the safety offered, and it is impossible to read the remarkable testimony of the man who says he saw the explosion of the Davy lamp at Leigh last week without having its inventor's warning recalled to mind. As long as the wire gauze of the lamp was not heated above redness he said it was safe, but if by any means it was raised above a red heat it was safe no longer. More

than this, he distinctly affirmed that fire-damp in rapid motion produced much more heat than when it was still, and that a current of air by raising the red-hot gauze to an approach to white heat would be the means of igniting fire-damp. The miner in such a case, he said, should turn his back to the current and hold the lamp before him, so as to screen it from the draught. It appears, however, that instead of screening the lamp from the out-rush of gas which was making the flame blaze perilously within it, one of the men shook it and blew it out, thus, no doubt, doing something to raise the red hot gauze to the white heat which Davy expressly declared would lead to explosion. He never, in fact, claimed "absolute" safety for his lamp. Besides the danger from currents of fire-damp, he thought that pure hydrogen might possibly be disengaged from coal, and though such a contingency was very unlikely, his lamp would be no safeguard against that. As we have already intimated, innumerable "safety lamps" have been used which have not fairly embodied his idea. In the school of mines in Jermyn street there are hanging at this moment no fewer than 220 different forms of "safety" lamps that have been under examination by the royal commission, who have recently issued a voluminous report, and most, if not all, are modifications of Davy's lamp. Besides the many variations of form, it was shown years ago before a parliamentary committee that badly constructed lamps, professing to be on Sir Humphrey's pattern, were answerable for many accidents, to say nothing of the reckless opening of "safety lamps" for the sake of a better light or in order to light pipes.

It seems due to the memory of a great and a good man to bear these things in mind now that there is a strong disposition to deify his invention. At the same time these terrible accidents undoubtedly prove that the real "safety" lamp has yet to be invented, and it may even be questioned whether the reliance that used to be placed in Davy's invention has not in one way done much to neutralize what the actual protection of the lamp has done in another. It has, we fear, engendered a culpable carelessness in the ventilation of mines. Mine-owners, there is a reason to fear, have been lulled by the cheap substitute for more costly systems of protection. Whatever lamps men may work with, more effective inspection and better systems of ventilation seem to be imperatively demanded. There appears to be little ground for hope that an "absolutely" safe lamp for miners will very soon be forthcoming. A year or two back, it may be remembered, Mr. Ellis Lever offered £500 for a lamp which should be perfectly self-contained, which working miners could conveniently carry from place to place, which would continue to give a useful light for not less than twelve hours, and which would not cause an explosion of gas under any circumstances likely to represent conditions which occur in actual practice. The judges were—Mr. Brett, M. P., for the Miners' National union; Prof. G. A. Adams, for the Royal society; Sir Frederick Abel, for the society of arts, and Prof. Sylvanus Thompson for Mr. Lever. To these competent judges 104 oil lamps and four electric lamps were submitted, but out of them all not one even approached to a fulfillment of the conditions specified, and the £500 could not be awarded.

A Good Hotel.

The Grand Union hotel, opposite the Grand central depot in New York city, is conveniently located for the accommodation of travelers. It is an excellent place for visitors as it is near the depot and easy of access from all parts of the city. The accommodations are of the first order—the rates are low, the rooms are ample and commodious, and the attendants courteous and polite. It enjoys a large patronage and is worthy of its popularity.—*Poughkeepsie Enterprise*.

Mine Accidents.

By an explosion Sept. 10th, in a colliery near Bristol, England, seven persons were killed and ten injured.

Frederic Keienberg, was instantly killed at the Cranberry colliery, Hazleton, Pa., Sept. 9, by a fall of rock.

Mark Barry was fatally injured Sept. 15th at Kohinoor colliery, Shenandoah, by the kick of a mule.

Robert M. Jones, of Shamokin, employed as a pumpman at Greenback colliery, was instantly killed Thursday evening by falling down the slope.

James Conlan, of Miner's Mills, Luzerne county, Pa., was almost instantly killed in Wadell's shaft, at that place, Sept. 10.

Owen McGorry, of Nesquehoning, Carbon Co. Pa., died from the effects of injuries received by a fall of coal, Monday. McGorry was a miner for thirty-eight years for the Lehigh coal and navigation company.

IMPORTANT.

When you visit or leave New York City save Baggage, Expressage and Baggage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot. Our Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best. Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided.

All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Miscellaneous Questions and Answers.

Editor Mining Herald and Colliery Engineer.

Question 1.—What is meant by a "garland?"

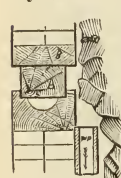


Fig. 1.

Answer.—A wooden or cast iron curb, set in the walling of a pit-shaft, to catch and conduct the water running from the crevices in the side of the shaft, and guide it into pipes which carry it down into lodgements or sumps. Fig. 1 shows a cross section of a garland or water curb as generally placed round the sides of a shaft.

Ques. 2.—What is the meaning of the term "hade?"

Ans.—"Hade" means the dip, inclination, or underlie of a fault measured by the angle between a vertical plane, and the plane of the fault. In Fig. 2 the dotted line A B represents the hade as distin-



Fig. 2.

guished from the throw or distance of displacement, which is represented by the line A C.

Ques. 3.—What kind of apparatus is a "jig?"

Ans.—A self acting incline plane, where the loaded car hauls up the empty one; the jig is fitted either with a drum or friction sheaves. Fig. 3 shows a very simple and efficient form of jig for short distances

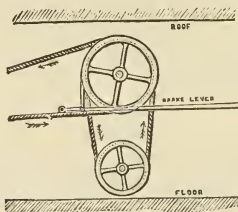


Fig. 3.

with light load, well adapted for temporary jig planes inside of mines where the amount of work to be done will not warrant the expense of permanent erections.

Ques. 4.—What is meant by "pack wall?"

Ans.—A wall of stone or rubbish built on both sides of a main road to support the roof and prevent



Fig. 4.

the sides from squeezing or bulging outwards. Fig. 4 represents such walls.

Ques. 5.—What is a "plug box?"

Ans.—A wooden box or water pipe used in coffering the sides of shafts to serve as an escape pipe for water as shown in fig. 5. They are merely pipes placed through the coffer to relieve the water pressure.

Ques. 6.—What system of mining is known as "panel working?"

Ans.—A system of working coal seams first introduced in the north of England about 1810. The colliery is divided into large squares or panels, each separated by a solid boundary or pillar of coal. In each panel a separate number of chambers are worked, and the ventilation of each panel has a separate intake and return connected with the main aircourses of a mine. By this arrangement each

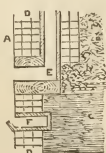


Fig. 5.

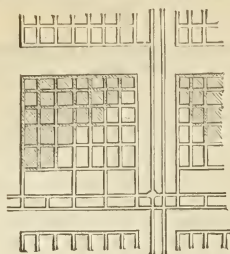


Fig. 6.

panel is isolated, and gas from one does not enter another but goes direct to the upcast. Fig. 6 represents a panel of work with its connecting intake and outlet, from and to the main airways.

Shenandoah, Pa., Sept. 8, 1886.

Good Advice to Bosses.

Editor Mining Herald and Colliery Engineer:

SIR:—In looking through the columns of your valuable paper, I noticed the proposition of Inspector Loutitt, viz: to call a convention of the mine bosses of his district the object being to give an impetus to the theories, new ideas, &c., of mining. I would say to the mine bosses of this district embrace the opportunity for improvement, for remember the words of the old adage:

"He that will not when he may,
When he wants he shall have may."

Do not be backward at the time the meeting is called. Attend to a man if possible. It is a duty to yourself and a benefit to your employer. Do not be afraid because you think you do not know quite as much as some of the mine bosses who will be there. There will be willing hands to receive you and assist you with pleasure. For you are just the men who are wanted to attend. On the other hand do not think because you hold a certificate of competency that you have all the mining knowledge that is required to work a mine successfully. Inspector Loutitt has an idea how far you are advanced, in mining by looking over the manuscripts of the late examinations and undoubtedly his idea is to raise you to a higher standard of mining, so that you will be able to keep pace with the more modern systems. There are among you men who have had considerable experience in different systems of mining and in different countries, in some of the most gaseous mines; have also had to contend with difficulties in sinking and tunnelling, besides noticing improved underground haulage and ventilation. Judging from experience there is plenty of room for improvement in this district in the system of haulage, ventilation and working of the coal, when you consider that a miner has to blast ninety per cent of the coal he is paid for (at most of the mines). If your mine bosses will meet and blend each other's ideas together I am sure you will derive a benefit from it. Who knows but what it might be the means of saving both life and property? And what a blessing if only one life was saved through ideas gained at such meetings as before mentioned. You would be amply repaid for your labor. Cast all excuses to the winds and meet together as brothers, with one object in view to assist and educate each other. Consider the foundation that has been laid for you by such men as Atkinson, Fairly, Wilson, Hopton, Wardle, Hyslop, Andre, Roy, and others. I am sure it would give the editor of the MINING HERALD great pleasure to publish the proceedings of such meetings. For is the paper not always admonishing mine bosses and thinking miners to read and study mining at the same time furnishing necessary information through its columns.

Thanking you for your valuable space and at the same time hoping that the mine bosses of the first Bituminous district of Pennsylvania may build up an institute that will reflect credit on its founders in years to come, I am

Yours truly,

WM. SEDDON.

Brownsville, Pa., Sept. 3, 1886.

Cokemaking.

Editor Mining Herald and Colliery Engineer:

SIR:—I would thank any of your readers who are acquainted with the above for a few practical hints through your columns on the best management of a set (72) of coke ovens; the number of men necessary, particularly those; the prices for loading, drawing, &c., and the weight of coke expected from a given quantity of uncrushed washed small coal, and whether day wages or so much per ton is the cheaper method. Is there any book on the subject?

Yours, &c.,

YOUNGSTER.

Latrobe, Pa., Sept. 10, 1886.

Colliery Explosions.

Editor Mining Herald and Colliery Engineer:

SIR:—I think if the following method were more practised in fiery mines that explosions might be reduced to a minimum.—In fiery mines not to work more than a certain area of coal away at once, and to keep the deep side or gob well packed up within about 6 ft. or 9 ft. from the coal face; then, when the weight comes on it will not force the gas out so

suddenly and unexpectedly. In my opinion the principal cause of explosions is from the gob being left open, which forms a magazine for the gas. Then when the roof weightens and the bottom lifts, it forces out the gas in large quantities. I do not advocate the system of working with naked lights and safety lamps in one mine; they all ought to be either the one or the other. Hoping you will insert the above in your next issue.

Yours, &c.,

J. C. B.

Pittston, Pa., Sept. 13, 1886.

Corrects the Working.

Editor Mining Herald and Colliery Engineer.

SIR:—I think "Staple" has made a slight mistake when he says

$$\frac{\sqrt{16 \cdot 6^2} + 12 \cdot 8^2}{2} = 14 \cdot 254,$$

sum of their squares. It should be

$$\frac{\sqrt{16 \cdot 6^2} + 12 \cdot 7^2}{2} = 14 \cdot 822,$$

sum of their squares; add to this half the sum of their diameters equal

$$\frac{16 \cdot 6 + 12 \cdot 8}{2} + 14 \cdot 822 = 29 \cdot 522,$$

and this multiplied by 1.5708 = perimeter; therefore 29.522 x 1.5708 = 46.373137 ft. perimeter required.

I am much obliged to "Staple" and "A. B. C." for their answers. If they would work the second question by a diagram I should feel obliged to them. The Theory and Practice of Ventilating Coalmines, on page 66, gives the following rule:

$$\frac{\sqrt{16 \cdot 6^2} + 12 \cdot 8^2}{2} + \frac{\sqrt{16 \cdot 6} + 12 \cdot 8}{2} = 46 \cdot 3736. \text{ Ans.}$$

$$2 \times 3 \cdot 1416$$

If Mr. Fairly or some one else will explain how he gets the 46.3736 I shall be very glad of the explanation.

I give the following rule, which I think is a shorter one to first question. Rule: Multiply the sum of the two diameters by 1.5798, and the product will give the circumference (nearly); that is putting t for the transverse, c for the conjugate and P for 3.1416, the circumference will be $(t + c) \times P$.

Yours, &c.,

J. R.

Shamokin, Pa., Sept. 14, 1886.

Berlin's Tailors.

The report of the statistical bureau of the city of Berlin, on the strength of the recent census, gives the total number of master artisans as 35,330, who give employment to 62,452 journeymen and assistants, and 13,284 apprentices. Of these 13,284 masters, 31,988 journeymen, and 7554 apprentices belong to the so-called city guild of workmen. The working women in the German capital, owing to the closing of the different associations by order of the police, are debarred from any concerted agitation for their relief, which has become a more and more serious question, owing to the scant earnings of this most useful class of society. Among the worst paid are the seamstresses of aprons, many of whom, although working from eleven to fifteen hours a day, only receive from 2 to 34 marks a week; while some of them, working for a better class of establishments, can actually make as much as 10 marks a day. The women who cover the paste-board stiffening in men's cravats can, if working twelve hours a day, earn about 4 marks a week; the gross is paid with 1 mark 80 pfennigs. It takes two hours to make a dozen, which is equal to 74 pfennigs (not quite two cents U. S. currency) an hour, out of which the poor woman has to pay her thread. Sewers of underjackets and drawers are better off. They can earn as much as 8 marks (\$2) a week, and are rich as compared with the button-hole makers. If a button-hole maker works from twelve to fourteen hours on week-days, and from four to five hours on Sunday, she can, at best, earn from 2 to 5 marks a week. Glove sewers are a little better off. For seven days of twelve working hours each day they get about 8 marks. The earnings of seamstresses of boy's clothing vary from 3 to 10 marks a week; umbrella sewers receive from 6 to 7 marks. Those who sew collars and underlinen, if working about fifty-four hours a week, can come up from 10 to 15 marks; but these are the few, while the many do not earn over 5 to 7 marks. Bead workers rarely get over 5 or 6 marks.

The Swedish and Danish newspapers have for some time been discussing schemes for the construction of a tunnel between Denmark and Sweden under the sound. The question of a submarine way between the two countries has been raised several times, but never so seriously as now. M. de Rothe has just presented to the two governments interested a plan for cutting a tunnel between Copenhagen and Malmö, in Sweden. The tunnel would be seven and a half miles long, in two parts, of which two miles would lie between the island of Amak and Saltholm, and five and a half between the latter island and the Swedish coast. M. de Rothe has been for several years employed as an engineer on the Panama Canal works.

OUR NAVY.

From the Sailing Vessels to the Steam Ships—In the latter.

In referring to the navy of the past, says Rear-Admiral Simpson in Harper's Magazine, it is impossible to avoid recalling the feeling of pride with which an American seaman—officer or man—walked the deck of his ship. This feeling was common to the naval and commercial marine. Our wooden ships that sailed the oceans in 1800 were the finest in the world. This old frigate Congress in 1842 was the noblest specimen of the frigates of the day, and the sloop of war Portsmouth was unsurpassed as a corvette. The clipper ships of that period need no eulogy beyond their own record. These ships were the models for the imitation of all maritime nations, and among the constructors of the period can be recalled, without detriment to many others, the names of Isaac H. Steers, Pook, and Delano. The pettyetry of sailing reached its zenith during this period.

But there is no sentiment in progress; its demands are practical and imperative, and the great motive power, steam, was being crowded to the front even during this the greatest development in the era of sails. Advanced ideas could not be resisted, and steam was admitted as the auxiliary, but the main motive power in naval construction still stood us in good stead, and enabled us to supply ships with auxiliary steam-power, which continued to be prominent for many years as standards to which others found it to their advantage to conform.

Before the final abandonment in the navy of sailing ships, pure and simple, an effort at a compromise was made by limiting steam to side-wheel vessels, and a number of fine ships were built in the forties, which did good service, and were a credit to the country, answering as they did the demands of the time. The Mississippi, Missouri, Susquehanna, Saranac, and Powhatan carried the flag to all parts of the world for many years, some of them enduring to bear their share in the late war, while the Powhatan is even now borne on the list of vessels of the navy.

The Monitor, of great fame, and the San Jacinto, were the only ships with screw-propellers that appeared in the period under consideration, the use of the screw being considered of doubtful propriety, to be tested by tentative experiments. These ships have long since disappeared, but the screw remains, and side wheels are relegated to boats for inland waters.

OUR NAVY IN THE LATE WAR.

The types of vessels that were built during the war were selected for special purposes. The effort was made to multiply ships as rapidly as possible to blockade the coast and to enter shallow harbors; the "ninety-day gun-boats" and the "double-enders" were added to the navy list, and merchant steamers were purchased, and were armed with such batteries as their scantling would bear. All of these vessels have disappeared, with the exception of the Tallapoosa. The Junata and Ossipee, of the Keokauque type, but of greater draft, were launched in 1862, and they are still in commission; and several vessels of large displacement and great speed were launched at about the close of the war, which were never taken into service, have been disposed of since, and form no part of our present navy.

The New Ironsides and the Monitor represented the two features of construction which, produced in this period of emergency, have continued to impress naval architecture.

As a sea-going iron-clad the New Ironsides was, for the time and service required, a success.

The Monitor was, without doubt, the most remarkable production of the constructive art that appeared during the war. The original Monitor was lost at sea, but the Passaic class of Monitors quickly followed the original of this type. The effect upon naval architecture by the success of Ericsson's Monitor is so familiar to all that it hardly needs more than a passing allusion here. There is no doubt that the Monitor was the progenitor of all the turreted vessels in the fleets of the world; the essential principle of the vessel, however, was never viewed with favor. This principle consists in the low freeboard, which, besides reducing the size of the target, was intended to contribute to the steadiness of the hull as a gun platform by offering no resistance to the waves, which were expected to wash freely over the vessel's deck; the horizontal overhang of the Passaic class was intended to contribute to resisting a rolling motion. The vessel was designed to be as a raft on the water, constantly submerged by the passing waves, hermetically sealed to prevent the admission of water, and artificially ventilated by means of funnels drawing air down through the turret. This was

the most startling feature about the construction.

PRESENT SITUATIONS.

With such a force as we possess it must be evident that it is impossible to discharge in an efficient manner all the duties of a navy. Our work in foreign surveys is limited to that of one small vessel on the west coast of North America; our deep-sea soundings are few and far between, dotted along the tracks pursued by our ships while going to and returning from distant stations; our commerce is protected; but we are unable to support any policy that the government might decide to declare in reference to, for example, the Monroe doctrine. To say nothing of European naval armaments, it is only necessary to point to some of the smaller powers in our own hemisphere that possess ships of war with which we have nothing fit to cope.

Our people cannot desire to assume a position in the society of naval powers without supporting the position with dignity; they cannot wish their navy to be cited as a standard of inefficiency; they cannot wish to force their representatives (the officers of the navy) into a position of humiliation and mortification such as is imposed by being called on to deprecate criticism by lame explanations. Better abolish the navy and lower our pretensions.

MEN WHO WRITE FOR PAPERS.

"Veritas," and his Numerous Co-Workers Who Conceal Their Identity.

Bill Nye contributes the following to the Chicago News, and the article is in his best vein:

My name is Veritas. I write for the papers. I am quite an old man and have written my kindly words of kindly advice to the press for many years. I am the friend of the public and the guiding star of the American newspaper. I point out the proper course for a newly elected member of congress and show the thoughtless editor the wants of the people. I write on the subject of political economy. Also on both sides of the paper. Sometimes I write on both sides of the question. When I do so I write over the name of Tax Payer, but my real name is Veritas.

I am the man who first suggested the culvert at the Jim's street crossing, so that the water would run off toward the pound after a rain. With my ready pen—ready and tranchant also, as I may say—I have in my poor weak way, suggested a great many things which might otherwise have remained for many years unsuggested.

I am the man who annually cries for a celebration of the fourth of July in our little town, and asks for some young eloquist to be elected by the committee, whose duty it shall be to read the declaration of independence in a shrill voice to those who yearn to be thrilled through and through with patriotism.

Did not I speak through the columns of the press in clear tones for a proper observance of our nation's great natal day in large gas extended caps the nation's largest banner would remain unfurled and the greased pig would continue to crouch in his lair? By the aid of my genial co-workers, Tax-Payer, Old Settler, Old Subscriber, Constant Reader, L. L. See, Fair Play, Mr. Pro Bono Publico, I have made the world a far more desirable place in which to live than it would otherwise have been.

My co-laborer Mr. Tax-Payer is an old contributor to this paper, but he is not really a tax-payer. He uses this signature in order to conceal his identity, just as I use the name Veritas. We have a great deal of fun over this at our regular annual reunions where we talk about all of our affairs.

Old Settler is a young tenderfoot who came here last spring and tried to obtain a livelihood by selling an indestructible lamp chimney. He did well for several weeks, due to the different residences and throwing one of his chimneys on the floor with considerable force to show that it would not break. He did a good business till one day he made a mistake. In stead of getting hold of his exhibition chimney, he picked out one of the stock, and burst it beyond recognition. Since that he has been writing articles in violet ink relative to old times, and publishing them under the signature of Old Settler.

Old Subscriber is a friend of mine who reads his paper at the hotels while waiting for a gratuitous drink. Fair Play is a retired monte man, and Mr. Pro Bono Publico is our genial and urbane undertaker.

I am a very prolific writer, but all my work is not printed. A venal and corrupt press at times hesitates about giving currency to such fearless, earnest truths as I make use of.

I am also the man who says brave things in the columns of the papers when the editor himself does not dare to say them, because he is afraid he will be

killed. But what reck Veritas the boat and tree? Does he flinch or quail? Not a flinch; not a quail.

Boldly he flings aside his base fears, and with bitter vituperation he assails those he dislikes, and attacks with unrelenting vigor his personal enemies, fearlessly signing his name, Veritas, to the article so that those who yearn to kill him may know just who he is.

But to Veritas we owe much. I say this because I know what I'm talking about, for am I not old Veritas himself? Haven't I been writing things for the papers ever since papers were published? Am I not the man who for years has been a stranger to fear? Have I not again and again called the congressman, the capitalist, the clergyman, the voter, and the philanthropist everything I could lay my tongue to, and then fought mosquitoes in the deep recesses of the swamp while the editor remained in the office and took the credit for writing what I had given him for nothing? Has not many a paper built up a name and a libel suit upon what I have written, and yet I am almost unknown? Who people ask, who is Veritas and where does he live? No one seems to know. He lives up seven flights of stairs, in a hot room that smells of old clothes and neglected thoughts. Far from the "maddening throng," as Constant Reader has so truly said, I sit alone, with no personal property but an overworked costume, a strong love for truth, and a shawl-strap full of suggestions to the over-estimated man who edits the paper. So I battle on, with only the meager and flea-bitten reward of seeing my name in print "anon," as Constant Reader would say. All I have to fork over to posterity is my good name which I beg leave to sign here.

The Air-Gun.

The air-gun is a pneumatic engine, for the purpose of discharging bullets by the elastic force of compressed air. It is not known exactly when or by whom it was first invented, but it was certainly in use in France three centuries ago. It is probable that had not gunpowder been discovered at so early a date, air-guns might have been made very effective. They are usually made in the form of a musket, having a hollow stock, which is filled with compressed air from a force pump. The lock is nothing more than a valve which lets into the barrel a part of the compressed air from the stock when the trigger is pulled. The gun is loaded with wadding and bullet in the ordinary way, and the bullet is driven from the barrel by the expansive action of the air. The range of the depends upon its size and the amount and degree of compression of the air. The velocity of the bullet is proportioned to the square root of the degree of compression of the air. Under the pressure of fifty atmospheres, or 750 pounds, for instance, the impulse given to the ball is almost equal to that of an ordinary charge of gunpowder. Air-guns are sometimes made in the form of walking sticks, so they can be readily used for purposes of defence. Air-guns are generally regarded as somewhat unsafe, but it is not known that any law has ever been enacted against them. In the hands of inexperienced or malicious persons they are capable of doing much mischief—Chicago Inter Ocean.

John Haberton on "Boating."

A married woman of my acquaintance was so proud of her figure—which was fully worthy of her admiration—that she never ventured upon any outdoor exercise except croquet, until she learned that she could paddle a canoe without dressing loosely. She longed about the water every evening in her husband's lightest canoe, while her liege lord paddled vigorously. Slowly and unconsciously she became able to "lay" a straight course with the boat. One day, she had a sudden impulse to chase her husband, and almost succeeded in overtaking him. The next day she appeared in a loose tennis jacket and scored a victory. Since then their have been many exciting races between the couple, and a more important prize than that wife makes with her bright eyes, glowing cheeks, dilated nostrils, alert air and splendid pose, as she sweeps by her husband, I do not ask to see. She is mother of several children, and has been married long enough to begin to look forward to her silver wedding, yet every girl of her acquaintance covets her figure. And she still wears that loose tennis jacket while canoeing.

His Education Nearly Finished.

Mrs. Grundy—So your son is being educated in England? Dear me! how popular he will be in society when he returns.

Mrs. Toady—Yes, the dear boy. I told him not to come back until he was perfect in the English accent.

"Am I also to be this time, surely?" "Not quite," he writes, that his pronunciation is correct, but he hasn't got the catarrh yet."

ABOUT EVERYTHING.

ITEMS OF A VARIED CHARACTER WHICH HAVE GOOD POINTS.

The shipments of foreign iron ore to Philadelphia during the last few months have been the largest ever known in the history of that port.

Isabella furnace, located on the Wilmington and Northern railroad, has been blown out for the purpose of making improvements.

The Reading railroad company is turning out several locomotives which are to show unusual speed, and will have the Wootton fire-box attached.

A ship is said to be building in England that will carry over 4000 tons, steam 103 knots per hour and burn only 28 tons of coal per day.

The American society of mechanical engineers has decided to hold its seventh annual meeting in New York city, the week immediately following Thanksgiving week.

The Taylor manufacturing company, of Chambersburg, Pa., is building two 125-horse power engines, one 80-horse power engine and three boilers for the electric light plant of Altoona.

It is announced that a powerful company of English capitalists, with headquarters in London, has got possession of an old concession for a railroad from Tuxtepec to the City of Mexico, and will build a road which, it is calculated, will involve the expenditure of at least \$25,000,000.

There is about to be erected in the premises of the national bank of Scotland, St. Andrew square, Edinburgh, the largest steel strong room or safe ever manufactured. Its external dimensions are fifty feet long by twelve feet broad and ten feet high, and a careful computation shows that within it might be stored about 1,250 tons, weight of gold bullion, equal in value to \$550,000,000. It is heavy in proportion to its size, weighing 100 tons. Its walls are believed to be thicker than those of any other steel room of similar proportions in use in the United Kingdom.

ANTHRACITE ADVANCED.

THE COAL MANAGERS MEET AND ADVANCE PRICES SLIGHTLY.

NEW YORK, Sept. 15.—At a meeting of the coal managers held here yesterday there were present: T. M. Richards, of the Reading; C. R. Holden, of the Delaware, Lackawanna and Western; James C. Hart, of the Delaware and Hudson; John F. Wilson, of the Lehigh and Wilkes-Barre; E. H. Mead, of the Pennsylvania coal company; R. H. Williams, of the Erie, and Frederick A. Potts, of the New York, Susquehanna and Western.

The session was a long one and the discussion related to the advance on the different sizes of coal, the ultimate decision being to advance chestnut 15 cents and all other sizes 10 cents a ton. The allotment committee meets on the 20th inst. to consider the October allotments, and the managers on the 30th inst. to consider further advances.

THE PARNELL LAND BILL.

EVICTIONS TO BE SUSPENDED ON PAYMENT OF HALF RENTS.

LONDON, Sept. 14.—The Parnell land bill, as redrafted, suspends evictions on payment into court of half the rent due. Many Gladstonians disapprove of the amount of the reduction. The Parnellites assert that the full values justify a demand of over 50 per cent. reduction. Mr. Parnell in a conference with John Morley urged a reduction of 75 per cent., but on Mr. Morley's advice limited it to 50 per cent. The government's response will be that Mr. Parnell's data are inaccurate. Sir Michael Hicks-Beach and Lord Randolph Churchill will deny that the bulk of the Irish tenants will be unable to pay their rents in November, or that a host of evictions are probable. The second reading will take place on Friday. Mr. Gladstone will return to London on Saturday and take part in the debate Monday.

SCIENTIFIC.

APPLYING DYNAMITE TO THE DRIVING OF PILES.

An engineer of Pesth has lately used dynamite for driving piles. A circular cast-iron plate, 15 inches in diameter and $\frac{3}{4}$ inches thick, is fixed on the pile to be driven in a perfectly horizontal position. A dynamite cartridge made in the form of a disk, six inches in diameter and three-fourths of an inch thick, containing 17 ounces of dynamite, is placed upon the cast-iron plate and exploded by electricity. It is stated that the depth to which the pile is driven by each explosion is equal to five blows of an ordinary pile engine weighing 143 Vienna cwt. falling 9 feet 10 inches. A cast-iron plate, on an average, resists 25 explosions.

LIQUIFYING GASES.

The temperature at which the common gases become liquified are given as follows by Prof. Dewar, the numbers expressing degrees below zero Fahrenheit: Carbonic acid, 112°; nitrous oxide, 130°; ethylene, the chief illuminating constituent of common coal gas, 154°; 20% nitrogen, 230°; air, 314°; carbonic oxide, 215°. The greatest cold yet produced by man, 325° below zero, was obtained by two Russian physicists by the use of liquid oxygen.

MAGNESIUM ILLUMINATION.

Magnesium, which has more than once been abandoned as a source of light, appears likely to be employed again, a process having been discovered for producing pure magnesium by electrolysis, and at a price much less than that at which it was formerly obtainable. At the works in Bremen, where the manufacture of magnesium is carried on, prizes are offered for the construction of the best magnesium lamps having clockwork movement.

AN ADHESIVE CEMENT.

One of the most adhesive and durable of cements for uniting iron furnaces is found to be the oxide of iron itself. With this a joint can be made so perfect and sound that the iron will break before the cement will part. As an illustration of this statement the fact is cited that in removing the cast-iron pipe of a bilge pump from a ship that had made four Atlantic voyages it was found necessary to take the sections apart; the flanges had been pasted with a cement of cast-iron drillings and filings mixed with sulphur and sal ammoniac moistened with water; then the nuts, three to each flange, were set up on the bolts, and the union was completed. The four voyages occupied nearly a year, and on the separation of the parts being attempted, even the cold chisel failed to make a division between the solid castings and the cement that intervened.

HE ATE SORREL.

It was a very curious and almost unprecedented chain of causes, we imagine, which brought about the death of a little boy at Birmingham the other day. The poor child ate during the day a quantity of sorrel which he found near his mother's house. In the night feeling thirsty, he drank freely of some soapy water which stood near his bed-side. Next day he died, and an inquest being held, the medical evidence was to the effect that the alkali of the soap acting upon the sorrel had formed oxalic acid, a poisonous compound by which the child had been killed.

FORMATION OF FOG.

It has recently been demonstrated that in a perfectly moist air no formation of fog is possible, however much the temperature is lowered, so long as the air is absolutely free from dust, and that the more air, sufficiently moist, is charged with such foreign particles, the more intense is the formation of fog. If filtered and completely moist air in a glass ball have its pressure diminished, only a few particles of fog will reveal themselves to the most careful inspection. But if a few cubic millimeters of ordinary house air be now admitted into this filtered air, a very fine, silvery, transparent fog at once forms itself, of such slight density that even in the case of a considerable area of it, the transparency of the atmosphere would be but very slightly affected.

Mr. Gowen is in New York. It is given out that his plans for reorganization will be made public in a few days.

THE RAILS.

LATEST BUSINESS DEVELOPMENTS IN THE CIRCLE OF RAILROADS.

Upon the application of Franklin B. Gowen, Judge Butler made an order requiring Examiner Pollock to file forthwith the testimony taken before him in the Robinson-Reading railroad general mortgage foreclosure suit.

The property and franchises of the Beech Creek coal company have been purchased by Cornelius Vanderbilt, Joseph M. Gazzman and Martin E. Olmstead.

The Lehigh alley railroad announces a quarterly dividend of 1 per cent, payable October 12, and to women only on the 14th proximo.

The receivers of the Reading railroad company have been compelled to abandon placing the car-trust certificates they were given authority by the United States court to issue. They state that their inability to place them at par was due to the rate of interest they were to carry—5 per cent.—and the fact that they were not made a receiver's obligation. The new equipment now being secured is paid for out of the revenues of the company.

The coalers were all higher in New York on the further compromise advance of 1045c in prices and the understanding that still another jump would be made on Oct. 1. Lackawanna touched 132, but the rise was too tempting for some holders, and one half per cent to the advance was clipped off.

President Clark of the Lackawanna coal and iron company, says that he has sold all the steel, iron, zinc, etc., that he can possibly deliver this year, and has refused further contracts. Sixty thousand tons of rails have been ordered in England, and there are inquiries for 50,000 more.

THE NEW LOCOMOTIVES

ON THE PHILADELPHIA AND READING RAILROAD.

The ten locomotives ordered for the Reading railroad, under the receivers' car trust recently authorized by the circuit court, have been delivered and are now in use on the road. They were built at the Baldwin works. Five of them are to be used in the passenger service and five for hauling freight trains. In addition, five passenger locomotives have been built at the company's shops at Reading to replace old equipment. These are also in service.

The new passenger locomotives are more powerful than any ever owned by the company. They are all supplied with the Wooten fire-box. A few slight changes have been made, the most noticeable in the fire-box. On all engines previously built the top of the fire-box sloped down toward the furnace door. In the new machines there is no slope, but the top is continued straight to the front of the fire box. This secures a rather larger heating area, and consequently increases the power.

The new engines have been tried and give perfect satisfaction. It is said they can run a mile in forty-two seconds with a loaded train. It is believed, should an emergency require it, a mile could be made in forty seconds or perhaps a little less. There is no probability that such speed will be required.

Two of them are now working on the Philadelphia & Atlantic City road, which at one time was very deficient in good motive power. Six or eight cars was the maximum an engine could haul and make schedule time, but the new locomotives can take eighteen cars through on time. The other engines are engaged on the main line, the Lebanon valley and other divisions.

The Miner's Convention.

INDIANAPOLIS, Sept. 16.—The National District Assembly of Miners and Laborers of the United States began its first annual convention here yesterday. They represent a membership of 30,000. The order was organized in St. Louis last May, being that branch of the Knights of Labor who are miners. The business has been confined so far to the appointment of committees on laws, grievances, state of the order, districting and finance.

ALL IN COAL.

STEADY GROWTH AND DEVELOPMENT OF THE MINERAL.

About eighteen inches of good coal has been struck in the new drift at Fall Brook.

The contract has been let for nail works at Lock Haven, which will be built at once.

There are one hundred and three coke ovens in operation at Ploga.

One of the drifts at the Arnot mines is being worked day and night.

It is rumored that the Lehigh and Wilkes-Barre coal company are going to renew their search for coal at the Green Mountain, in the vicinity of Wilkes-Barre.

A large fleet of American clipper-ships, which have been carrying general cargoes of merchandise for the Pacific coast are now going to Baltimore to load bituminous coal for San Francisco.

No. 1 breaker, of Honey Brook, Schuylkill county, Pa., has been abandoned. The coal that is taken from the slope is now carried over a new road, lately constructed for the purpose, to No. 5 breaker.

The Coxo coal company is erecting a large reservoir south of W. T. Carter's colliery at Coleraine, Carbon county, Pa. About five hundred feet of three inch iron pipe will be used in conveying the water to the Coxo colliery.

The breaker of W. T. Carter at Coleraine, Carbon county, Pa., is being razed and will be rebuilt. About two hundred men and boys will be thrown out of employment for about two months by this improvement.

The Mahanoy City Record believes that if the Pennsylvania company carries out its professed intention of reducing the tolls on coal carried from this region to market it will not have made its new road up the Schuylkill Valley in vain. It is probable when the road is finished this fall that it will carry coal to the shipping points for a 80 ton. The Philadelphia & Reading now charges \$1.50 and did charge \$1.50.

THE READING RAILROAD.

A REPORTED COMPROMISE BETWEEN GOWEN AND THE SYNDICATE.

PHILADELPHIA, Sept. 16.—Repeated announcements that a compromise had been arranged between Mr. Gowen and the Drexel syndicate advanced the price of Reading stocks and bonds rapidly yesterday. The generals went up 1 per cent., the incomes 3, and the stock nearly 1 point. While the rest of the market was strong, Reading was the most marked feature on the list.

Mr. Gowen was in New York all day, and little could be learned in this city about his movements. Gentlemen connected with the syndicate seemed to have little knowledge about the reported compromise. Mr. A. J. Drexel said: "Yes, I have heard the rumor, but I have no advice how the matter is going on. They have not come together yet, that's positive." No inference could be drawn from Mr. Drexel's manner as to whether he thought they might come together subsequently or that he was convinced a compromise was impossible. Mr. John Lowler Welsh also delivered himself of a delphic utterance: "All I can say is, I have not been invited to attend any conference for the purpose you mention." In his statement.

Notwithstanding these remarks, information came from apparently reliable sources that the compromise negotiations were well under way. It was stated that a very important meeting was held in New York on Monday between Gowen's friends and members of the syndicate. Mr. A. J. Drexel was mentioned as one of the gentlemen who attended the meeting. The negotiations, it is said, were nearly concluded and it was expected they would be finished on Tuesday. For some reason there was delay yesterday afternoon. Word came from a gentleman in New York who is on the inside that everything was going on swimmingly, and that the whole matter would probably be settled in the evening. A search was made for Mr. Gowen in New York last evening by an *Inquirer* correspondent, but he was not to be found.

Reading-Pennsylvania Affair.

Account of a recent interview that is of interest:

Reporter: But they say that when the Reading's property is foreclosed the Pennsylvania can buy some of the Reading coal lands; and thus get coal tonnage enough for their Schuylkill railroad.

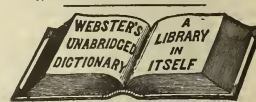
Mr. Gowen: When the sky falls we can all catch larks—and the lark tonnage produced in this manner will always be greater than the coal tonnage secured by the Pennsylvania railroad company through the disintegration of the Reading property.

The Health of Allentown.

The county fair.—People who intend coming to the Allentown fair need have no dread or fear of the sickness that has been prevalent in the city of late. The fever has died out, no new cases having been reported within the last two weeks, and those taken with the prevailing disease weeks ago are now all in a rapidly recovering way, and hence strangers can again come here without the least risk. While there was a good deal of sickness here during the summer, typhoid was not at any time as reported.—*Allentown Democrat*.

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A BELGIAN COLLIER'S HOME.

How he and His Family Subsist and How he Labors to Obtain the Means.

The condition of the Belgian collier is as a rule far from enviable. The conditions under which work is performed are at many collieries exceedingly severe. Some of the Belgian mines are amongst the deepest on the continent, and the wages as we showed recently, very low, so low indeed that the government compels the payment into a fund by the colliery proprietors, of a sum equal to a certain percentage of the workmen's earnings, which serves as a sick and superannuation fund, and for the partial support of the widows and orphans of the colliery employes.

There are, however, some works where, though the wages are low, the conditions, through the humanity and benevolence of the employers, are such as make employment at these collieries almost a pleasure. The Hasard collieries of Belgium recall Saltaire in England and St. Johnsbury, Vt., and South Manchester, Conn. From an account of these works by C. E. Hall, of England, we extract the following: The Hasard company provided in the first instance houses for the employes. These cost \$500 each, and were let at 80c. per month. In many cases they also furnished them. Improving upon this, later on they built two magnificent hotels, close to the pits. Everything was carefully considered for the comfort of the workpeople. On the ground floor is a large cafe. The dining room will seat 100 persons; there are kitchens, bakeries, baths and lavatories, provision and clothing stores, a good library and reading room well supplied with books, newspapers and illustrated journals. A steam engine forces the rain and spring water through every story. The furniture in each room costs \$20.

At 5 a. m. the bell rings. The workman breakfasts from bread and coffee. He takes a similar quantity into the pit with him. At 2 p. m. he comes out of the pit, calls for clean things bearing his number, with towel, enters a bath room supplied with hot water, ties up his dirty clothes in the spent towel, and sends it down a shoot into the wash-house. The washing is done by machinery, employing four persons, who wash 2000 articles per day. His toilette finished, the workman goes to the dining room, where he obtains a substantial dinner and a pint of beer. The following is the bill of fare (which is charged daily), and the cost to him—20c. per day for food and 8c. per day for lodging: First breakfast: Bread and butter, 358 grammes; 353 6 grammes equal a pound; a very large cup of coffee—price 20 centimes; Second breakfast: Ditto, with a larger cup of coffee, 20 centime (5 centimes equal a cent). Dinner: Soup, 1 half-litre, (a litre is a little less than a quart); potatoes and vegetables, 800 grammes; meat, 125 grammes; bread, 100 grammes; beer 1 half-litre; price 45 centimes. Supper: Potatoes and vegetables, 700 grammes; bread, 100 grammes; beer, 1 half-litre; price 20 centimes. Total, 105 centimes per day. After dinner the workman is free to enjoy himself. He takes a walk or has a nap, amuses himself in the cafe with cards or dominoes, or in the library if fond of reading. There is a dancing school, a gymnasium, and a musical society. Eight o'clock is supper time; at nine in winter and ten in summer they retire to rest.

It is certainly wonderful that so much can be supplied for so little money, but it gives satisfaction, and I can speak confidently as to the cleanliness and comfort of the place; no charge is made for interest on capital invested. The Hotel Louise fully furnished cost \$36,000 for 200 workmen. The cost of living in the hotel as against a private house is about one-half. There are no rules and regulations; the workmen are told "that in order to reside in the hotel, you must work regularly for the colliery and conduct yourself decently towards your companions and the servants of the hotel." In this way good order is kept, the miners being their own policemen.

As a consequence of this system of treatment constant employment is found. There is no Saint Monday or half-work.

Many come out of the pit at twelve, and go down again at 2 p. m. working until six, thus making double time. Some are bachelors, others married, who return to their families every Saturday. There is a large concert hall, and a brass band numbering fifty executives, who play several times per week. There is a large hotel, with requisite attendants, medical aid, and stores.—*American Manufacturer.*

A Man with an Iron Hand.

While passing down Dupont street near the Academy of Sciences recently, a *Chronicle* reporter observed a man pounding away on a nail with his hand. It was in a blacksmith's shop which opened on the street. The nail seemed to penetrate further and further into the wood, and the man did not appear to feel as if the striking of his hand against the nail hurt him at all. Approaching nearer, the reporter saw that the hand was made of iron. The

steel-fisted man said that, while participating in a Fourth of July celebration in Marysville in 1864, he lost his right arm at the elbow by the premature explosion of a cannon. Being a blacksmith and a keyfitter the loss compelled him to abandon his trade. For five years he wandered about the country, doing one thing or another. One day, while in a blacksmith shop in Vallejo, the idea entered his head to fabricate an artificial hand out of iron. He gave his directions and had the contrivance he now wears manufactured. It consists of a steel cylinder about four or five inches long. To this is affixed a leather apparatus, which enables him to adjust the artificial hand on the stump of his arm. The stump fits into the apparatus and is carefully strapped. The hand may then be used as a hammer, and the dents in the steel show how much it has been so applied. The deficiency of fingers to grasp a file is supplied in the following manner: A long hole projects into the base of the cylinder, into which a file or knife may be screwed. This properly tightened, and the loss of fingers is not felt. If the iron-handed man desires to pick up anything, he adjusts a peculiar hook or an instrument resembling a chisel, and he can bring anything to his reach he may require. Besides the heavy hand, which he generally uses for hard work, he has a more delicate apparatus of brass, manufactured by himself, for easy work. He says that he has worn the steel hand for sixteen years, and he has grown to regard it with great affection. He scarcely feels the loss of his natural hand. As he hammers or files at saws behind his little glass window on Dupont street the passers-by gaze curiously.—*San Francisco Chronicle.*

Average Prices of British Coal.—1885.

From the mining and mineral statistics of the United Kingdom we extract the following statement as to the average selling prices of coal in that country for 1885.

ENGLAND AND WALES.

	s. d.		s. d.
Westmoreland.....	7 6	South Staffordshire.....	5 4
Yorkshire, North Riding.....	4 6	Derbyshire.....	5 2
Cheshire.....	7 0	Flintshire.....	5 2
Shropshire.....	7 0	West Lancashire.....	5 2
North Staffordshire.....	5 9	North Wales.....	5 2
Somersetshire.....	6 8	Pembrokeshire.....	5 2
Gloucestershire.....	6 6	E. and W. Yorkshire.....	5 0
Glamorganshire.....	6 5	Cumberland.....	4 9
N. and E. Lancashire.....	5 9	Northumberland.....	5 8
Monmouthshire.....	5 6	Warwickshire.....	4 9
Worcestershire.....	5 6	South Durham.....	4 6
Breconshire.....	5 4	North Durham.....	4 4
Carmarthenshire.....	5 4	Leicestershire.....	4 3
Derbyshire.....	5 4		

SCOTLAND.

Edinburghshire.....	5 6	Dumfriesshire.....	4 6
Gallowayshire.....	5 6	Pertshire.....	4 6
Dundee.....	6 6	South Lanarkshire.....	4 6
Haddingtonshire.....	5 0	Ayrshire.....	5 5
Argyleshire.....	4 8	Fifehire.....	4 3
Dumfriesshire.....	5 4	West Lancashire.....	4 2
West Strathgairn.....	4 8	Renfrewshire.....	4 2
Clackmannanshire.....	4 6	East Lanarkshire.....	4 0

Speed of Machines.

A very simple way of getting at the speed of any machine you are about to start, and which has an intermediate or counter-shaft, and is to draw a perpendicular line, and put the speed of line shaft and all sizes of the drivers on the left-hand side of the line. Then put all the sizes of the driven pulleys, with x for the required speed, on the other side of the line. Thus: Take the speed of a line shaft at 300 which has a pulley twenty inches in diameter driving tight and loose pulleys on a counter-shaft which is ten inches in diameter. This counter-shaft has a pulley eighteen inches in diameter driving a cutter-head whose pulley is three inches in diameter. What is the speed of the cutter-head? By putting the figures representing the driving speed and all the drivers on one side, and all the driven on the other and working by cancellation, we find that the required speed of the cutter-head is 3600, thus:

$$\frac{300 \times 20 \times 18}{10 \times 3 \times X} = 3600.$$

This same rule is equally handy for the determination of the size of any drivers or driven pulleys, driving or driven speed. It is simple and direct method, and it is accurate and quickly learned. It beats guessing all to pieces.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Sept. 18, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	59,194-14	1,537,910-08
Shipped South.....	50,791-12	1,883,362-01
Total.....	109,985-06	3,421,272-09
For corresponding time last year.....	69,329-16	1,515,431-17
Shipped North.....	55,278-11	1,707,006-07
Shipped South.....	124,608-97	3,223,038-94
Total.....	14,619-01	198,234-05
Increase.....		
Decrease.....		

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F. M. Co. Box 115, Newport, Ky.

Chicago.

From the Industrial World.

The coal trade is in much better situation than it has been for a long time. The demand for all kinds is greatly improved. Manufacturers are nearly all doing better business, and consequently their wants are greater. They are in the market with round orders for soft coals. Shippers of anthracite are beginning to be somewhat alarmed about the continued scarcity of cars, for with some of them it will be a question whether they can get their coal to the distant towns in the northwest before snow flies. We hear of one large dealer who has orders on hand for 5,000 cars, who has only been able to ship 50 cars since the first of the month. This seems to be the experience with all hard coal dealers. The scarcity of cars will continue until part of the present grain crop moves east. The soft coal producers are not having any trouble in this direction, as they have all the cars they can use. The stocks all through the country are small, and the general movement of coal to supply the deficiency will be large. Lake freights are steady at 75 cents from Buffalo.

Dealers in anthracite are doing a thriving local business, and the statement is made by some of them that they have never had so much coal moving about the city at any one time as at present. The shippers, as stated before, are troubled for want of cars, and the retail merchants are short of teams. Consumers seem to have suddenly come to the conclusion that coal is cheaper now than it will be a few weeks hence, and they are in the market with good orders. It is understood that dealers are more independent, and that less cutting is being indulged in in order to secure further business. There has been no change in prices, excepting perhaps that there is a little firmer tone to the market.

Soft coals are coming into better request, and the movements in the same is heavier than last week. The stocks in the local yards are very light. Steam coal is also selling more freely. Prices are stiffening up under the increased demand, but as yet no change in quotations is announced.

There is no great demand for canal coal, but inquiries are more numerous, and the movements in this coal promise to be better later on.

Coke is selling freely with a steady demand. Values are steady at last quotations.

There is nothing of importance quoted in charcoal.

ANTHRACITE.

	Per net ton by carload.
Grate.....	\$ 25
Stove.....	5 25
No. 4.....	5 50
Nut.....	5 50
Lehigh Lump.....	7 20

BITUMINOUS.

Erie & Briarhill.....	\$4 15
Pittsburg.....	3 20
Indiana Block.....	2 40@2 60
" Slack.....	2 25@1 35
" Nut.....	1 65@1 80
Baltimore & Ohio.....	2 75@2 90
Hocking.....	2 75@2 90
Youghiogheny.....	3 20@3 30
Wilmington.....	2 10
Blossburg.....	2 00
Cumberland Smithing.....	3 25
Sonman Smithing.....	3 40
Grape Creek.....	2 00
Fountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Monk.....	2 00
Morris.....	2 00

CANNEAL.

Kanawha.....	4 50
Buckeye.....	4 25

COKE.

Connellsville Coke.....	4 75@5 00
Cushed Coke.....	5 50
Charcoal, carload per bu.....	8 1/2@8 3/4

Pittsburg.

From the American Manufacturer.

The Ohio river continues too low to permit the movement of either loaded or empty coal craft, and operations at the mines along the Monongahela are still almost entirely suspended, and at the railway mines, 75 per cent are in operation. Prices are unchanged, and we therefore continue to quote as follows:

PRICES AT PITTSBURG.

River, wholesale, on board.....	3 1/2@4 1/2 cts. per bushel.
Railroad.....	4 1/2@4 3/4 cts. per bushel

AT CINCINNATI.

River, wholesale, on board.....	5 1/2@6 1/2 cts. per bushel.
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AT LOUISVILLE.

River, wholesale, on board.....	5 1/2@6 1/2 cts. per bushel
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AT NEW ORLEANS.

River, wholesale, on board.....	25@26 cts. per bu.
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Bushels are rated among dealers here at 76 lb.—26 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4/7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke.—All the features are substantially the same as reported last week: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

The iron trade is booming.

LABOR LEGISLATION.

The Legislative Committee of the Knights Submit a Report On Congressional Action.

The first report of the legislative committee of the Knights of Labor has just been made public. It is full of interest to the working people, the politicians and, indeed, to the public generally. This committee was created last spring by the general assembly of the Knights and its appearance at Washington made quite a stir among the lawmakers. The committee consisted of Ralph Beaumont, an old labor agitator of Elmira; Jno. J. McCarthy, a ship carpenter, of Baltimore, and James Campbell, a glass-worker, of Pittsburg and president of the universal federation of glass-workers of the world.

The committee, after mature deliberation, decided to ask for certain measures in order that they might put every member on record. After referring to several of the measures in which they were interested the committee reports that when they reached Washington they found that Mr. Morrison, of Illinois, had introduced a joint resolution in the House covering the point in the resolution adopted by the K. of L. assembly at Cleveland relating to the paying out of the surplus money in the United States at a rate of not less than \$10,000,000 a month.

The resolution was bitterly opposed by leaders on both sides of the house, members being divided more by geographical than by political lines. The eastern men with few exceptions opposed the measure while the western members supported it. It was defended by Congressmen Morrison, Warner and Randall, Democrats, and Brumm and Weaver, Greenbackers. After a debate covering more than two days, in which several amendments and motions to recommit were voted down, it was carried by a vote of 207 yeas to 67 nays. After the resolution passed the house it was placed in the hands of the senate committee on finance. When the chairman of your committee sent John Sherman a letter requesting the privilege of replying to Mr. Jordan, after waiting within one hour of the time for the assembling of the senate committee, and receiving no reply from Mr. Sherman, Chairman Beaumont sent his card to Mr. Sherman. He sent back word that he had no time to hear Mr. Beaumont.

"Mr. Sherman did not have time to listen to your committee, but did have time to keep the resolution in his possession for more than ten days and hold two caucuses of his party at his house in the meantime to consider what policy it was best to pursue, and only brought the resolution out of his committee after Senator Coke, of Texas, gave notice that he would move at a certain date to relieve the committee from further consideration of it and bring it before the senate for action. The resolution, as amended by the senate committee, passed that body by a vote of 42 yeas to 20 nays, with fourteen not voting, and the Massachusetts senators, Messrs. Dawes and Hoar, voting in the affirmative.

"After the passage of the resolution by the senate a committee of conference was appointed. The conferees on the part of the house were Morrison, of Illinois; Breckinridge, of Kentucky, and Hiseock, of New York. Your committee are sorry to say that the conferees on the part of the house made a complete backdown, and surrendered every vital principle of the resolution, and the house concurred therein by a vote of 120 to 63. There are a few men in congress who, the committee believe, have the welfare of the people at heart, and whom they can heartily commend to their constituents. Among them we enumerate the following: John A. Anderson, Thos. R. Cobb, Lewis E. Payson, W. J. Stone, of Kentucky; W. J. Stone, of Missouri; Wm. E. Fuller, Barclay Henly, Charles S. Voorhees, Nicholas E. Worthington, John W. Daniel, Richard P. Bland, William H. Neece, Albert S. Willis, James B. Weaver, John H. Regan, Roger Q. Mills, Olin Wellborn, Timothy E. Tarney, Henry B. Lovering, Wm. M. Springer, Chas. N. Brunn, Martin A. Foran, Wm. H. Craln, John J. O'Neill, Wm. McAdoo and A. J. Warner."

Wire Rope Transmission of Power.

F. C. Roberts, the engineer of the Trenton iron company, New Jersey, has prepared an excellent little treatise on the application of wire rope in transmission of power, which the company has published in a neat pamphlet for general circulation. The transmission of power by wire rope is extremely novel, having been introduced in Switzerland in 1850, and being employed at present in Europe, as Mr. Roberts says, in a large number of places, estimated at 8000. But, strange to say, the development of the system in this country has been relatively slow, and mostly limited to small distances and dimensions. Its superior capacity, efficiency, and economy do not seem to have been

generally recognized by American engineers. Mr. Roberts' brief but clear discussion of the system, its applicability as compared with belting and shafting, the apparatus and devices employed, and the mathematical principles involved, will be welcome and useful in many quarters. He fixes the minimum span for the advantageous use of wire rope transmission at 50 feet, and says that belting or shafting will be more economical for shorter distances. On the other hand, the maximum advantageous space for wire rope is 400 feet; but by the use of intermediate stations, it can be used for long distances, where hydraulic pipes, flumes, compressed air or electricity would be the only alternatives, and each of these, except under peculiar conditions, would be far more costly. We quote a passage from Mr. Roberts' treatise that forcibly states this aspect of the case: "Valuable water-powers are lying idle in this country for want of suitable building sites in their immediate vicinity, the cost of required flumes, etc., being too great to warrant their construction. To such problems, the transmission of power by wire rope offers a ready and economical solution. As an example of this, we would refer to the system erected near Schaffhausen, in Switzerland. The Rhine at this point develops a series of rapids, into which are inserted a number of turbines, aggregating in all 600 horsepower. The character of the banks preventing the erection of buildings in the vicinity, the developed power is transmitted by wire rope to the town, a mile distant, and there distributed to various manufacturing. In our own country, we may refer to the utilization of water-power at Lockport, New York. The Erie canal has passed through a series of locks, the power developed by the descent of water from one level to another being utilized to drive a number of turbines, the power here obtained being transmitted in turn to various consumers." Mr. Roberts does not fail to point out also the convenience of wire rope transmission of power from one department of a manufacture to another, and to express his surprise that it is not more frequently employed.

Running a Locomotive Without Smoke or Sparks.

The Boston Herald reports an interview with R. L. Walker, the inventor of a firing apparatus which prevents smoke and sparks, from which the following is quoted: "Smoke and sparks," said Mr. Walker, "are simply evidence of an imperfect combustion. That's the problem in a nutshell. The need of a device to consume smoke and sparks is apparent to any one, and I think I have solved the problem. This imperfect combustion necessarily implies waste of fuel, and consuming smoke and sparks adds to the motive force of the fuel. As applied to locomotives its value is apparent. It means comfort in traveling, economy in fuel, and safety from fire by sparks from a locomotive, such as will cost thousands of dollars loss every year." "How is it done? Is the process an expensive one?" "Not at all. The alterations are in the fire-box alone. The fire-box is divided longitudinally by a water-leg, thus practically making two fires, which are separated by a throat in the forward end of the water-leg. Some thirty inches above the grate bars a corrugated brick arch is built over both fires to within thirty-six inches of the doors, where a throat is formed through the combustion chambers and leading to the tubes of the boiler. In the centre of this throat is hung a wrought and cast iron water damper, which can be manipulated at will by the fireman, and which controls the direction or circulation of the currents or draughts to the fires. These fires are cooled alternately. Supposing the right hand fire has just been replenished (the damper being down on that side) the smoke and sparks made are carried through the water leg, and must pass over the left hand fire, which is in an incandescent state, and mixing with the heated oxygen are burned, the corrugated brick arch causing any flying cinders to be deflected downward into the fire. When the left hand fire wants coaling the damper is reversed and the operation is in the opposite direction." This system has been tried on several roads with success, Mr. Walker says.

Use of Molasses for Making Briquettes of Coal and Ore.

A German chemist and metallurgist, Dr. Kosmann, strongly recommends the use of molasses for forming small coal and fine ore into solid briquettes, as first proposed by Saltery. A mixture of from 1 to 13 per cent of molasses was sufficient to make a good dust of very lean Silesian coal, into good solid blocks that gave a strong coke. Such blocks are also excellent for gas-making. In similar manner, blocks can be made of any powdery iron ore, such as some magnetic ores, and pyrites residues. For the direct production of iron from ore so treated, it is proposed to have chambers built in connection with coke ovens in such a manner that the gases from the ovens can be made to pass through the charge of iron ore. Worked, for instance, in connection with a range of Coppee ovens, as each Coppee chamber will hold 3 tons of coal, the chambers for the iron ore would require to be about one-fifth the size in order to hold an equal amount of ore of from 65 to 70 per cent. Such a charge would give about 2 tons of iron sponge, and a charge could be put in, reduced, and drawn out every four hours, so that in twenty-four hours 12 tons of sponge would be produced. The sponge would be squeezed and hammered, and the bloom, after reheating, drawn out to bars, which would be cut up and used as excellent material in the Siemens-Martin or in the crucible steel process.

New Manganese Mines.

The New York Times says: James B. White & Co., of this city, have completed the purchase of a 5000-acre tract of manganese ore land in Virginia. This purchase will enable these gentlemen to supply the home market with sufficient manganese ore to shut out the greater part of the spiegel and fine manganese imported from England. They will commence the development of the tract at once, and inside of a few months will have a new town built and about a thousand men at work, who will be getting an output of five hundred to eight hundred tons of ore per day. The new purchase lies twenty miles from Waynesburg, and is within three miles of the Shenandoah Valley railroad. Messrs. White & Co., will at once commence the construction of a branch road, and it will be pushed to completion as rapidly as possible. Men are at work now developing the tract and they find that ore is reached at a depth of about eighty feet. It lies in large bodies, or packets, and it does not run in veins like coal. As soon as the exact lay of the ore is determined on, the work of mining will be commenced. The tract lies up in the mountain, where there are no dwellings, and contracts for the building of a town will be let. 200 houses will be erected at once, and in the meantime the shafts will be sunk and all the men ready for the beginning of work in the mines. The company expects within eight months to be able to ship at least five hundred tons of the ore per day. The deposit is so large and the ore so easily mined that they expect to have no trouble in doing this. The present demand for manganese and spiegel, which contains 40 per cent, of manganese, is about 20,000 tons a month. With the exception of the Cambria iron works and the mills of the Carnegies, all these metals are brought from England, and the manufacturers have always labored under a disadvantage. By their purchases of these two firms have been given a great advantage over all other manufacturers, and have consequently secured a great lead. The less favored mills have tried to secure mines of their own, but so far have failed. The Whites will be able to place in the market at least 10,000 tons per month of manganese or from their purchase. This will shut out half the English imports, and with a little more time they may be able to double their capacity.

Figures for the Thoughtful.

Census statistics show that the people of this country, during the two hundred and fifty years of their existence as colonies, territories and states, up to 1860, accumulated and held property to the aggregate value of only \$14,000,000,000, including all landed and personal property. During the twenty years next succeeding the commencement of the war of rebellion—some people have paid out, in war, national state and municipal expenses, a greater amount than all they had accumulated up to the commencement of the war; and yet, with all that immensity of outlay in taxes, customs, etc., they had nevertheless, during the same term of twenty years, accumulated, as shown by the census of 1880, the enormous sum of \$22,000,000,000, or about seventy per cent. more than the total accumulation of the previous two hundred and fifty years!

We now come to another class of figures which present an equal subject for thoughtful consideration. Of the 22,000,000,000 people who do something—some work or engaged in gainful pursuits—18,000,000, or nine-tenths of these earn on the average not much more than \$300 a year, which is necessarily consumed in means of subsistence, while substantially all the savings go to the other one-tenth. Is it any wonder that in view of these later figures we are just now in the midst of a general industrial paralysis. We have a million of workmen idle for want of work to do, and capital in still greater proportion than unemployed labor lies dead or unproductive, and that, too, while our hills and mountains are full of mineral wealth, while millions of acres of productive lands wait for the plow and homes for homeless millions are to be had for the taking. It is estimated that the 20,000,000 of our wage-earners make an average annual saving of about \$75 each. Whatever number of persons save double the average yearly saving, or \$150, an equal number save nothing. For as many as acquired \$250, or three times the average annual saving, a like number not only saved nothing, but fell the average yearly saving of \$75 short of the necessities of comfortable existence. Facts plain as these show how dangerously near the great mass of men always are to want and suffering.—*San Francisco Scientific Press.*

Copies of the New Mine Law.

We had printed a large number of both the new Anthracite and Bituminous mine laws of this State for sale at this office, but we found the demand for them so large that both have already been completely exhausted. We therefore printed another and larger edition of each of the laws mentioned for those who desire them. They have been carefully read and compared with certified copies from the Governor. The price per copy of either the Anthracite or Bituminous law is only 10 cents. Not a single miner in the State can afford to be without the law affecting the region in which he resides.

There are evidences that the Reading railroad will be reorganized on some basis in harmony with the Pennsylvania railroad.

READING'S REORGANIZATION.

How the Settlement Between the Interests Was Reached.
The Company's Future.

Friends of President Gowen, of the Reading railroad, have come to an arrangement with the Morgan-Welsh syndicate by which certain changes are to be made in the plan of reorganization of the company, and Mr. Gowen is to retire. The Reading Reorganization Trustees met on the 19th to act upon the proposition and Mr. Gowen's resignation as president of the company is in the possession of the syndicate, to take effect as soon as the modifications of the plan are agreed upon.

An agreement was last week reached between Mr. Alfred Sully and Mr. Edward Lauterbach, a New York lawyer, by which Mr. Gowen resigns from the presidency of Reading and Mr. Sully and his friends unite with the Morgan-Welsh syndicate and assist in the plan of reorganization. The letters from Mr. Sully and Mr. Lauterbach to Mr. Gowen, Mr. Gowen's reply and Mr. J. Pierpont Morgan's letter approving the suggestions of Messrs. Sully and Lauterbach fully explain the nature and result of the negotiations.

The new propositions are set forth in Sully and Lauterbach's letter. The only important change in the plan of the reconstruction trustees is the proposition to issue an income mortgage bond in all cases where under the present plan preferred stock is issued. This proposition was agreed to readily, as there is some question of the legality of the issue of preferred stock, and the syndicate have always been ready to make this change if it was thought desirable.

The other changes in the plan proposed and accepted by the syndicate are: The increase in the capital of the syndicate by \$4,000,000, to be placed by Mr. Sully and his friends on the approval of Mr. Morgan and Mr. Seligman; the increase in the board of Reconstruction trustees by the admission of Mr. Sully, Mr. Dow, Mr. Wanamaker and Mr. Borie; to provide for reorganization without foreclosure if possible; to increase the executive committee of the trustees by the addition of Mr. Sully, to give sixty days for the creditors to accept the plan before foreclosure is pushed, after which reorganization is to take place by foreclosure for the benefit of those who have accepted, an alternative plan under foreclosure to be presented at the same time the modified plan is presented to the creditors "for information," the voting trust to be continued. Any changes other than the above to be subject to the approval of the syndicate, and the plan is to be pushed by the appointment of Mr. Corbin as receiver and president of the Reading company, to which Mr. Gowen writes that he is willing to accept all these changes, and encloses his resignation to Messrs. Sully and Lauterbach, who turned it over Mr. J. Pierpont Morgan, who locked it in one of the safes of Drexel, Morgan & Co. Mr. Morgan in a letter also approves of the changes proposed personally.

As a matter of fact the changes in the plan are trivial and with one exception unimportant. The necessity of foreclosure is admitted, and the sixty days' grace to creditors would have been given in any event. The syndicate have been ready to admit the Sully and Dow interest at any time, just as they are admitted. The voting trust is continuing and the whole plan is practically unchanged, except as to the issue of income bonds instead of preferred stock. The syndicate have given up nothing or nothing, and they have got what they insisted on all the time—the resignation of Mr. Gowen.

It is a curious fact that nothing in the unearthing of Mr. Gowen was discovered of his syndicate. Messrs. Sully and Dow were there willing to put up some money, and Messrs. Seligman and others were on hand to assist in any other way than to put up money, but this is all there was of the thirty-two million syndicate of which so much has been heard for the last six months. Indeed, Mr. Gowen's friends take only a four-million interest in the sure thing offered by the Morgan-Welsh syndicate.

As soon as the agreement was signed in New York the syndicate moved promptly for a meeting of the Reconstruction trustees, and before those gentlemen left their business places they had received a neat little card from Secretary O'Brien calling them together at 4 o'clock the 19th. The meeting would have been called for 11 o'clock, but it was feared that the legal papers would not arrive in time. There is no doubt but that the trustees will agree to the new proposition at a very early date, probably at this meeting.

This new move will not make the slightest difference in the foreclosure proceedings, it is, of course, not known whether all the creditors will accept the new plan; the Wharton-Kemble party certainly will not, and for this reason the alternative plan under foreclosure will be sent out with the new proposition to the creditors. A leading member of the syndicate said Saturday that he expected the foreclosure decree in October without any reference to the plan.

In an interview Mr. Sully gave an interesting account of the manner in which the conflicting interests in the Reading railroad property were

harmonized and a satisfactory plan of reorganization reached. After discussing the manner in which he became interested in the deal he said:

"Mr. Gowen and his friends were afraid the Pennsylvania railroad would obtain the preponderating influence in the management of the property. He was satisfied, however, that Mr. Corbin would not undertake the management of the property unless he did so entirely untrammelled, uncommitted and independent—as nobody's man. That was distinctly understood, and for that reason Mr. Gowen was satisfied with him. When that was finally settled we were a long way advanced."

"How long ago was that determined?"

"That was two weeks ago."

Next came questions of how the plan of reorganization should be modified to make it satisfactory and acceptable to all the security holders generally, for it was quite apparent that the "syndicate's" original plan was not satisfactory to the security holders. "Then came the question of control. Objections were to Mr. Baer because he was interested. I think he is one of the officers of the road; at any rate, he is in some position. To Mr. Sayre the objection was raised that he was interested in a rival corporation; he was in the same business. In like manner Mr. Henry Lewis was recognized as being Mr. Gowen's friend. So Mr. John Wanamaker was agreed upon to take Baer's place, and the fifth man, it was agreed, should be selected by them to fill the place of Mr. Sayre."

"The question of Mr. Gowen's resignation has never been a disturbing factor, because from the start he has always said that he was ready to go the moment he felt satisfied that everything was provided for. In fact he has rather insisted upon it, and I must say this—that I have never seen a symptom of any selfish motive cropping out anywhere in Mr. Gowen's connection with this property."

"Mr. Gowen will now probably go to Europe for a few months with his family. His ambition is to practice law. He can make \$100,000 a year at the bar. Of course he does not feel too kindly toward certain people who have attacked him and who he thinks have betrayed him. First of all Mr. Gowen stood on one thing—that Mr. Corbin was to be made the company's sole receiver. It was shown him that there were good reasons against that course and he did not hold out for his demand, but it is understood that Mr. Corbin is to be the real man. With these things arranged," said Mr. Sully, "Reading enters upon a great future. There never again will be poor earnings as there have been."

"What will help the earnings?" "Well, first of all they have the remarkable low cost, any way, and naturally there would be a large increase. And, again, I think the business will be conducted in a more business-like manner. Here is a property that without the Jersey Central has earned \$37,000,000 per annum. Now, if there can not be enormous net earnings saved from that it is very singular."

"This means amicable relations with the other coal-carrying companies?" "I think so. What I know in that direction is that the president in one of those companies met me the other day and he said that he hoped we would soon get this thing fixed, because it was what they needed to bring about stability in the business."

"How about the relations with the Jersey Central?" "The lease has been given up, but the Jersey Central people are allowing the property to remain in the hands of the Reading. They had better do so, because it helps their earnings, and I do not see how it can better their position to take the management of their property into their own hands. I think Reading stock is worth as much as Jersey Central."

SAFETY LAMPS FREE.

Every mine boss should possess a good safety lamp, even if the mine does not give off fire-damp. There is no telling when it will make its appearance, and a safety lamp may be wanted at any moment for purposes of investigation. Any person sending us five new yearly subscribers and the money for the same, can have Williams' improved safety lamp, or the Boss' pocket safety lamp sent free.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

Lehigh, Iowa, is booming its coal deposits. The seams are from 2 ft. 8 in. to 4 ft. in thickness, the roofing is good and the deep ravines afford in most instances an opportunity for drift openings, there being but one slope and two shafts among the fifteen mines now in operation. The building of the C. C. R. R. to a connection with the Illinois Central, at Judd, in 1876, gave a great impetus to the coal business in Lehigh. New mines were opened, improved methods introduced, the market widened by the persevering effort of active and efficient salesmen, and all the advantages imparted to the business which skill and enterprise could invent. Yet the industry has labored all along to the present time under that killing disadvantage, lack of direct communication and easy transport to the market. But that cloud is now largely dispelled by the advent of the two new railroads,

GIRLS IN COAL PITTS.

A Gloomy Picture of Underground Industrial Life in a Foreign State.

A young unmarried girl of seventeen said in reply to questions: "My work in the coal-pits begins at 5 o'clock in the morning and ends between 9 and 11 at night. I load from fifty to sixty cars every day, and I earn 2 francs a day. I went regularly to school from my eighth to my twelfth year. I could read once, but I have forgotten it all now. Pit-work ought to be prohibited for girls."

Upon being questioned more closely by the president she said it ruined the morals of every good-looking girl. "The overseers bribe the prettiest girls by giving them the best paid work."

A married woman said: "The week before last my husband earned 13 francs. He had never earned a larger sum in a week. It is impossible for us to live upon such a wage. When I have bought our food and firing the whole wage is spent; it is not enough to cover rent and clothing."

The mother of a family replied: "I scarcely know the taste of meat."

Another young girl said her working day in the pits began at 4:30 or 5 A. M. and closed at 11 P. M., for which she received 1 franc 80 centimes to 2 francs. A younger sister left off work at 6 P. M., but she only earned 1 franc 50 centimes. Nearly all the girls volunteered, in almost the same words, the emphatic statement: "Girls ought not to be allowed to work in the pits;" and they were unanimous in their complaint of the temptations put in their way by the overseers.

The president asked each of them: "What nourishment do you have? Do you often take meat?"

One girl replied: "Three months ago we had some meat on our table; I have never tasted any since." Another said: I take a bottle of water with the fruit every morning; I can not afford coffee."

The president asked an old workman who had spent his life in the pits why no effort had been made by them to bring their condition before the public. "I would gladly have given evidence," said he, "but I knew that I should be dismissed if I told any story about the work. My comrades have urged me to speak for them, as I have had so long an experience. But I was afraid to do it."

His present wages are 2 francs a day. When he was younger and stronger he used to earn the sum of 2 francs and 50 centimes a day.

The president asked if the workers found regular wages or piecework more profitable.

"The day wage is miserable," said the old man, "but piecework no better, for if the overseers find that a man earns more by piecework, the terms are at once lowered."

One of the working-class leaders, who was examined at great length by the president and commissioners, denied that the work folk were socialist revolutionaries. They will follow any leader in their despair, but their own actual demands are very simple. The president asked him to formulate as shortly as possible the real programme desired by the workmen and women in the pits.

Speaking of the employment of children he said: "We want the work day for children limited to eight hours, and their wages fixed as follows: Children of 12 to 13 years, 1 franc 20 centimes a day of 8 hours; from 13 to 15 years, 1 franc 60 centimes; 15 to 17 years, 2 francs."

The president—Then you would not abolish child labor?

"We would not abolish families. My family consists of nine persons, only three of us earning anything. We have to keep six who are not earners. The united yearly income of the three of us who are workers is 1,500 francs."

The president asked if they would not like their children to go to school after the twelfth year.

"No," replied the workman; "it is not possible for parents to wait until a long school term is ended, as the family needs the wages of the elder children. We have not only to keep our young children, but also our old people. After his fiftieth year a man can earn little in the pits, and is usually dismissed."

This speaker—whom the workers were particularly anxious to have examined, as he is in good repute both as a workman and an orator—told the commissioners that the average weekly wages of the head of a household in full work is from 12 to 14 francs. "I need not say that a family can not live upon that; the wife must work when she can, the children as soon as they can."

A married woman, who had been a worker in the coal-pit, said: "I am the mother of six children. We are very poor; but I would rather starve than that one of my girls should go to work in the pits. The overseers use all means in their power to ruin the girls. If nothing else succeeds, they will put a tiny young girl to work in a solitary place until she is terrified."

When she was asked what wages her family earned, she replied that her husband had 13 francs a week and one of her sons 50 centimes.

To the question as to the food of the family she said: "Every Sunday and Thursday I buy a pound of meat; on all other days we live on potatoes and bread."—*Charteroi Revue Industrielle.*



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-AT-

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FOR THE WEEK ENDING

SATURDAY, SEPTEMBER 25, 1886.

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TRADE PROSPECTS.

Information gleaned during the past week on the state and immediate prospects of trade is uniformly encouraging. From all sections of the country come reports of satisfactory and increasing activity in all branches of manufacturing and distributing trade. Money is reported easier and collections surprisingly prompt, and the feeling of business security and stability is rapidly increasing. Generally speaking, business continues to improve and the prospects for a large and profitable fall trade were never brighter. As to what circumstance or combination of circumstances this fact is attributable there is likely to be a diversity of opinion, but most people will concern themselves little about the cause that may have produced the effect.

It may be well, however, to note carefully what conditions were most active in bringing about the unexpected improvement in general business which the country is now enjoying. Periods of great business activity are invariably succeeded by periods of depression and stagnation, and it might be worth something to us to know when the next depression comes what agency will be most potent in bringing about the revival. During the past three years we have all differed widely as to the causes which led to the business stagnation which set in in 1883, and being unable to determine the cause we failed to agree upon a remedy. We did agree, however, that there was a deplorable loss of public confidence, and that money, instead of seeking investment in speculative and industrial enterprise, was going into hiding in the bank vaults. In the meantime a contraction of values and consequent augmentation of debt and business disaster followed. These were the facts. During the past year the order has been reversed. Fresh confidence has been inspired, business has improved, and the number of business disasters has been constantly diminishing.

These are facts, but the causes are not so clear. It will be observed, however, that the improvement has been more rapid during the past two months than during any like period since the revival set in a year ago. While congress was in session and tariff and currency changes were feared there was but little if any improvement, but since it has been finally decided that neither shall be disturbed during the next year and a half, there has been a veritable business boom. The extent to which the treasury disbursements of money in liquidation of the public debt have been instrumental in bringing about this revival of business and restoration of confidence cannot be calculated, but taking for a basis the predictions of disaster made by the advocates of the repeal of the silver coinage laws, and noting how nearly verified they have been, we can safely estimate the strength of this as a factor in the case. Had their advice been followed and had the coinage of silver been suspended we should be experiencing a shrinkage of values and further stagnation instead of a revival of business.

In no particular branches of industry has the improvement of the past two months been greater than in the iron and coal industries. Speaking of the former industry, President James Swank, of the American iron and steel association, said a few days ago, that the present year will be the most active that the iron and steel trade of this country has ever known, not excepting even the year 1880. The demand is reported by him to be uniform and the tone of the market remarkably healthy. Prices have not advanced materially of late but there is a feeling in favor of increased prices which with the increasing demand, must soon result in an advance.

What is true of the iron and steel trades is also true of the coal trade, both Anthracite and Bituminous. The Anthracite trade is surprisingly active, even for this season of the year. The carrying companies find it difficult to transport the enormous production of the mines and the coal disappears from the tide-water shipping points as fast as it can be deposited. The demand is greater than at any time in six years, but the production is so large that prices have not advanced materially yet. There is a certainty, however, of an unusually active fall trade, and it is not impossible that advanced rates may be obtained in the near future.

A CO-OPERATIVE MOVEMENT.

The leading members of the Knights of Labor are making a strong effort to induce the members of their order to join their new organization, the Order of Co-operators. None but Knights of Labor can become members of the inside order. Its members

are being largely increased in the east, and it is said that circulars are now being sent through the west calling upon the Knights of Labor to become members and start workrooms throughout the country. No branch has been organized as yet in the state though it is the intention to form one at an early date. The object of the order is to organize all classes of labor for mutual benefit, so that all shall share the same advantages. Consumers are to be supplied from distribution depots; manufactories will supply the demand created by these depots. Land will also be purchased to raise the articles needed by these manufactories and consumers. All persons who labor are eligible, if they are members of the Knights of Labor. By this scheme it is proposed to eliminate the effects of competition from the exchange between the producer and consumer, and have an equitable distribution of the earnings of labor and the profits of production.

It is proposed, before establishing manufactories, to avoid all danger of over-production. It is claimed by the promoters of the new organization that individual co-operative enterprises give the profits to the few employees, and they have to enter into competition in order to sell their goods. They are almost always failures when not organized into joint stock companies. The present co-operative scheme is also intended to develop the intellectual, social and moral condition of the worker. Competition and the wage system are to be abolished, and there are to be neither strikes nor boycotts.

By establishing these "distribution industries," it is claimed, give a more equal distribution of the fruits of labor. It is said that already arrangements have been made by which the order purchases all necessities to be supplied to members. The details of the scheme will be an important topic to be discussed at the general convention of the K. of L. at Richmond, Va.

The delegates representing different sections of the Knights of Labor are beginning to organize themselves and decide upon a line of policy to be followed at the general convention. It is said Charles Litchman, of Marble Head, Mass., has been pledged one hundred delegates from the largest and most powerful district assembly in the order. Mr. Litchman is one of the most influential men in the order, and his delegation will have a powerful influence at the convention. It is said Litchman with his influence with other delegates will have much to do in the selection of officers and the shaping of the future policy of the organization. He is an ex-officer of the general assembly.

A NEW YORK trade paper editor proposes as one solution of labor troubles the formation of a shop council, composed of employers, and employed in one concern. The plan reads nicely, but it is weak. No employers, or very few at least, are willing to pull their business management inside out and show all the elements and facts; and, if they did, workmen would not attach proper value to risks and a half dozen factors which experienced employers are obliged to take into account.

A BOSTON miner is building a reservoir in the Chihuahua mining district to run the mines in dry weather. There are several mining regions where there are long dry spells which can be avoided by similar measures. Two professors have at last been found who discovered something. They have discovered that in three mines in Brazil there are \$150,000,000 worth of unmined gold which American enterprise will help develop.

THE attempt to advance the rate of open-air labor in the southern states to equalize it with prices north, will not be easy, because there are twelve months work in the south, and only six or seven months labor here. Besides, but little meat is used; cheap fruits and vegetables form the chief part of subsistence; rents and the cost of living are lower, and hence wages must remain lower.

MONONGAHELA Valley, Pa., miners are going to load coal hereafter with forks instead of shovels, thus avoiding the handling of nut coal and slack, which the operators claim not to want and do not pay for. The forks will be graded to the screens and as the latter do not go below 1½ inches, nothing will be loaded that is finer in size. The outcome of this move will be worth watching.

FIVE years have passed since Leadville had its great boom and its mines are today producing

more tons of ore, containing more ounces of silver and gold, and more pounds of lead, than ever heretofore. Leadville has a dozen mining companies that pay dividends ranging from 20 to 60 per cent. per annum of the market value of the stock.

FROM a circular issued by Secretary Raymond, we learn that the forty-sixth meeting of the mining engineers will be held at St. Louis, Mo., beginning Tuesday, Oct. 12. All communications concerning arrangements, rooms, etc., should be addressed to the secretary of the local committee, Elliot C. Jewett, P. O. Box 576, St. Louis. The office of the local committee, of which Prof. W. B. Potter is chairman, is at 214 Olive street. The hotel headquarters will be at the Southern hotel.

SECRETARY TURNER is issuing Knights of labor charters at the rate of three hundred a day. This rate of increase is unprecedented in the history of labor organizations and is indicative of a stupendous strength for capital to grapple with in approaching labor contests.

HONDURAS MINING COMP'YS

The Honduras Mining Company, J. P. Imboden, Supt.—Honduras, C. A., August 11, 1886.

The following report by General Manager Imboden, covering the work done at the mines up to August 11, 1886, is published for the information of the stockholders:

YUSCARAN, HONDURAS, C. A., Aug. 2d, 1886. The Honduras Mining Company, 140 Nassau Street, New York:—GENTLEMEN:—Since my last report we have been pushing the work of erection of the shaft house and machinery building, and the work is all finished and in first-class condition with plenty of room and substantial in every way.

The new "shut off" gate valve was received, and Mr. Garrigan put it in place. It acts with great accuracy and the same for our wheel as the steam valve for an engine.

The machinery is all in first-class condition; the belting is all placed and all works smooth and well. The connecting pipe is in position for the *air drills* in the shaft and ready for working. We have not started the drills, waiting to perfect our level to the vein. We will start the drills next week, and prosecute the sinking with all dispatch.

The hydraulic works are going on well, and we are taking out quite a lot of good ore. The work is nearing where I think we may find the first pillars in our veins. I will say that I have never seen better work done under the circumstances, and I think Major Phillips, whom you know, and who has seen the "giant" at work will testify to its worth to us. It will require several months to get into the heart of the old works, but when we do get there we will find thousands of tons of good milling and concentrating ores. Our water supply is abundant and will be so till late in January, when we may have to stock up somewhat with the Giant. We are getting ores ranging from \$25 to \$90 per ton, and of course some good over that. I have found several pieces of the old Guayabilas vein, and will send to you by the next bullion shipment, which will be September 1st.

We are now picking out ores and hauling to the old Coco arastra, where we are now grinding, and will dry the pulp and *rehaul* to the present silver mill for treatment by roasting and amalgamation.

The month of July I could do but little. In spite of my attention I could get but little work done, and in the last shipment to The Paraiso Co. I could only send you brick No. 88, containing 396 ounces. More care will be taken now and we will gradually work up the ores to a decent sum. With our concentrators we would have all the work a 10 stamp mill could do. We have to use concentrators because much of the ores are of low grade and yet will pay well on the mill if crushed and the concentrators saved either for shipment or treatment here. If no "Frue Vanner" concentrators have been sent out, I advise the Company to purchase two at once and forward immediately. One week will repay all the expense, and the matter should not be neglected one moment. We have all the 20 to 50 ounce ores we could possibly treat if we could only concentrate the tailings. These ores would give only a low return if worked now and the tailings lost. I urge this for economy and profit, and each day that we wait for the concentrators is a loss of hundreds of dollars to us, and the Company should see that there is no delay about this matter.

I will say that with the proper means of working we have no ores so poor that we could not make great profit and dividends from them, and I will say that six months ago these pieces of machinery were ordered. Careful consideration of all points show this to be the policy of all the companies now here, or likely to come here. The "Frue

Vanner" we think the best adapted to our work here; if there is opposition to this machine then send others, anything that is good, but don't send *cheap* or worthless machinery for anything.

I am, gentlemen, yours truly,
J. P. IMBODEN.
Manager of The Honduras Mining Company.

CAPT. R. F. WILLIAMS,
President of The Honduras Mining Company,
YUSCARAN, HONDURAS, C. A., August 11, 1886.
DEAR SIR:—I am in receipt of your note and letter of 3rd July, and note carefully all you say. The points are all considered.

The work of preparing for extraction for treatment of the ores from the "Trinidad" vein has been going on for some time, and was going on before either your cable or letters were received ordering the work done. My reports to the company have treated on this subject, and given you the main facts.

We are now starting up all the machinery, and will begin the regular work of extracting the ores for treatment as rapidly as we can do it. As the present capacity of the Reduction Company will be limited, I will select all ore and run up the grades as far as possible in this way, and when the stamp mill and concentrators are in shape we will treat all other lower grade ores. We will keep the needs of the Company before us, and do all we can to forward the best interests. We will also select ores from the hydraulic side.

In my opinion The Paraiso Company has a number one man in Mr. Rodda, and will soon boom to the front. With their 20 stamps complete, and 20 more about ready to put in their, success is an assured matter.

My reports to Company cover about all points of interests.

I am, dear sir, yours truly,
J. P. IMBODEN.
Manager of the Honduras Mining Company.

To Utilize Niagara Falls.

FOR years the study of many engineers has been to utilize the unlimited water power afforded by the Niagara river in the most practicable and cheapest manner. This immense power has never been used except to a very small extent. A company of capitalists and experienced men has been organized and incorporated as the Niagara river hydraulic tunnel and sewer company, whose base of operations is to be at the village of Niagara Falls. Their object is to develop the water power of the great river at an estimated expense of \$3,000,000. The main point of the scheme is to construct a tunnel from the water level below the falls, 200 feet below the high bank of the river, extending through the rock to the upper Niagara river at a point about one mile above the falls, where a head of 120 feet is attained. The tunnel thence is to extend parallel with the shore of the river and one and one-half miles, at an average depth of 100 feet below the surface of the earth, and at a distance of about 400 feet from the navigable waters of the river, with which it is connected by means of conduits or lateral tunnels. Since the incorporation of the company, on March 31st, sufficient land along the river has been secured, surveyed, and apportioned into mill sites, fronting on the river and on the line of the proposed tunnel, with ample streets and dockage, affording facilities for approach by rail and water to accommodate 230 mills of 500 horsepower each, or 115,000 horse power in all, which is the engineer's estimate of the capacity of the proposed tunnel. Some idea of the effect of this tunnel may be had from the fact that it will develop a power largely in excess of the combined power in use at Holyoke, Lawrence, Minneapolis, Cohoes, Lewistown and Lawrence, and it will not cost more than one-tenth of the outlay for the development of the power at the places designated. The company expects to found a manufacturing town at Niagara Falls. The plan was made by Thomas Evershed, one of the state engineers.

Revolving Screen.

AN improved revolving screen is now being manufactured by the W. S. Tyler wire works company, of Cleveland, O. Many of these screens are in successful use in different parts of the United States and Canada for the purpose of sifting all kinds of coal and ores. The results from the use of revolving screens are most satisfactory, as the work is thoroughly performed. Space will not admit of a full description of the construction of these machines, the shaft running through the centre is from 3 to 3½ inches in diameter, according to the length and diameter of the screen, with sufficient projection at both ends. At each end is a steel conducting and discharging band for receiving and delivering the coal or ores.

The arms are made very strong, and are well secured to extra hubs. The upper ends of the arms are made with T plates which are bolted to the outer and inner bands. The wire cloth is also bolted through the outer and inner bands, securely holding all parts of the screen together. One great advantage is that by removing a few bolts a section of the screen cloth can be taken out and replaced by new without having to remove the entire screening surface, which is done by a delay of one or two hours. In the manufacture of this wire cloth, great care is taken to use only the very best annealed Bessemer steel wire, carefully selected for that purpose. The crimps are made very deep, so that the wires cannot be easily displaced. The meshes are made even and uniform. These screens can be operated with pulley, spoked wheel, or by gear and pinion.

GENERAL ABSORPTION.

The Knights of Labor to Swallow the Amalgamated Association.

Arrangements have been completed for merging the national amalgamated association of miners and mine laborers into the Knights of Labor.

Competing districts can be better regulated and reductions in wages, which are often forced throughout the coal-producing districts in the United States as a result of the reduction being accepted in one district, is an evil which under the new arrangement will be remedied if not entirely removed. The proposition which is made by the national federation will be fully laid before the miners and they are expected to take early action.

President Britt, of the Clearfield region, was in Phila., Sept. 21st, closeted in the office of the miners association. He left for home during the forenoon and will at once present the new proposition to the miners of that district. Delegates will be sent out to different parts of the state on the same errand.

"I can not say what will be the result," said George Harris, president of the Pennsylvania miners' association, who had labored long and earnestly to place his organization upon a firm basis in this state. "It all depends upon the miners. I can not answer the question for them. They act, not the officers."

Another labor leader said: "I think the move is a general one. All bickerings and jealousies now existing between the two organizations will be overcome. The miners of the country will then form a division of the great army of the Knights of Labor and they can fight labor's battles shoulder to shoulder with other branches of organized labor under the banner, 'An injury to one is the concern of all.'"

W. H. Bailey, the miners' representative on the national executive board, Knights of Labor, is at the head of the new organization. A quiet visit to this city a few months ago was for the purpose of making a survey of the field. It is stated, on what purports to be reliable authority, that one-half of the miners of western Pennsylvania are already members of the Knights of Labor and will hail with delight the formation of the new federation.

Care of Mine Cables.

THERE is probably no more important feature in the economies of a large mine than the care which is given to the mine cables. Upon their condition depends often the lives of the men who trust themselves in the cage or in the mine. One would think, therefore, that the cables would receive the greatest attention and care. And so they do, each large mine having a rope-man whose duty it is to make a daily inspection of the cable, repair it, lubricate it, tar it, and report its condition to the superintendent. The rope-man is responsible for the condition of his ropes, and his position is therefore an important one. It occasionally happens, however, that the spirit of economy prevails to such an extent that the superintendent insists on running longer than the man who has it in charge and knows its condition thinks proper, or the rope-man tries to keep patching up his old material to save ordering a new cable; therefore we occasionally, though not often, hear of serious accidents from breaking cables.

The cables, in order to preserve them from the effects of dampness and heat, must be lubricated and tarred. In very hot and wet shafts or inclines the cables do not last as long as in cool, dry ones. In using tar in hot shafts, the tar runs and makes more or less dirt. Under some circumstances the tar when old gets brittle and chips off. In some large mines the ropes are changed once every month or two months, the one removed being put in thorough order before being put in use again. Too great care cannot be taken of these important portions of mining operations. There are several patented systems of cleaning and preserving cables, and almost every rope-man at a large mine thinks his method the best.

No less than five explosions of hollow cast iron pistons have occurred in French workshops in the last twenty years in reheating these pistons—generally for the purpose of removing the piston rod. Investigation into the interior of a piston in use for eleven years showed the existence of a brown substance containing fatty matter, oxide of iron, peroxide of iron, and carbon. It is thought that a certain quantity of water had been forced into the cavity in service either through the iron or through imperfections in the plugs with which the original core support cavities were filled. This water, in forming oxide of iron, set free its hydrogen, which filled the piston cavity. The recombination of this hydrogen with the oxygen at a low red heat would produce the explosion, and it is recommended that all such pistons be tapped before reheating.

IMPORTANT.

When you visit or leave New York City save Baggage, Expressage and \$3 Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot.

613 Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best. Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city. 23-ly

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Miscellaneous Questions and Answers.

Editor Mining Herald and Colliery Engineer:

Question 1.—What is known in mining as "piling?"

Answer.—In starting on the surface to sink a shaft in soft wet ground, piling is sometimes resorted to by driving into the ground 3 inch batons shod with iron 12 or 14 feet long, forming a large circle and supported by "curbs," inside of this temporary wall the shaft proper is walled up, the piling

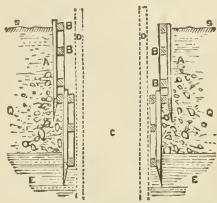


Fig. 1.

being only to keep back the loose ground until the permanent shaft can be placed. Fig. 7 shows the plan of holding back the ground, until the shaft walls are built inside, *a a* is the batons, *b b* the curbs, *c* shaft, *d d* the walling, *s s* surface line, *g g* loose water logged ground, *e e* solid stratum.

Ques. 2.—What in mining is meant by a "quarry?"

Ans.—An underground excavation formed for the purpose of obtaining material for storage or for building pack walls; only done where it is less

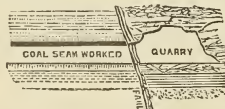


Fig. 2.

costly than to leave pillars of coal in the mine or to bring material from the surface for the purpose. Fig. 3 shows the vertical section of such a quarry.

Ques. 3.—What is a "scissors fault?"

Ans.—A fault or dislocation of the strata where



Fig. 3.

the coal seams are thrown together at one point, as shown in Fig. 3.

Ques. 4.—What is "single board stall" working?"

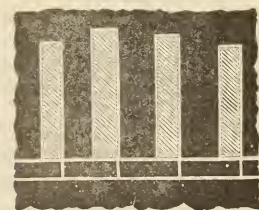


Fig. 4.

Ans.—A system of working each chamber with separate ventilation as shown in Fig. 4. Shenandoah, Sept. 22, 1886.

Matters of Air.

Editor Mining Herald and Colliery Engineer:

SIR:—Will some able and willing reader of the MINING HERALD give an answer to the following questions?

1. There are two airways, A and B, passing 20-

000 cubic feet of air per minute. A is 400 yards long, and B is 2,000 yards long, sectional area 64 square feet in both cases. What must be the area of regulator in A, in order to make the quantity passing in each to be the same?

2. An air mine A is 300 yards long, and is then divided into two airways, B and C, of equal length and area. The readings of an anemometer are taken in A and C consecutively. What is the reason that the reading of the anemometer in B and C added together do not equal the readings of the anemometer in A?

Yours, &c.,

Minersville, Pa., Sept. 20, 1886.

Yielding Due Honor.

Editor Mining Herald and Colliery Engineer:

SIR:—At the last examination for state mine inspector of Illinois, the board of examiners gave four questions on the "fan," which questions have appeared in the columns of the MINING HERALD, for some of your able correspondents to answer. After the examination the members of the class (your correspondent being one) felt that questions had been given that could not be answered by the board themselves, and were not calculated to be of any benefit to the class. But time which reveals all things has proved that the board of examiners were men well fitted to fill their position, and that the questions given by them on the fan have been the means of causing more research and investigation on this all important question than otherwise would have been made. Great credit is due the board, and especially to J. J. Johnson, of La Salle Mining Engineer, for the manner in which the examination was conducted; they having advanced the mining interests of this community by giving an incentive to thought and investigation into the theoretical and practical workings of centrifugal machines; it being a subject upon which, comparatively speaking, little thought had been bestowed by those preparing themselves for the examination.

Yours,

T.

Edwards, Ill., Sept. 13, 1886.

Finding the Air Volume.

Editor Mining Herald and Colliery Engineer:

SIR:—I see in the MINING HERALD of Aug. 14 from one of our Houtzdale men as follows: If 6000 feet of air pass in an airway 10 by 10, how much will pass through one 5 by 5, pressure to remain the same? I would solve it as follows:

The square root of 40 multiplied by 100 equals 632.400, and the square root of 20 multiplied by 25 equals 11550, then as 632.400 is to 11550 so is 6000 to 1061. Now let us assume the headings to be 12500 feet long and find pressure that is used in the large airway, p equals 26881 multiplied by 12500 multiplied by 40 multiplied by (06 multiplied by 06) divided by 100 equals 488558 feet of air column as the pressure in use.

Now find velocity in small airway for same pressure— V sq. equals 488558 multiplied by 25, divided by 26881 equals 457. Now let us assume the headings to be 12500 feet long and find pressure that is used in the large airway, p equals 26881 multiplied by 12500 multiplied by 40 multiplied by (06 multiplied by 06) divided by 100 equals 488558 feet of air column as the pressure in use.

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issue hoping some of your able correspondents will give a correct solution or answer:

1. How many horse power would be required to raise 4000 cubic feet of water per hour from a mine 180 fathoms deep?

2. How many gallons of water would a steam engine of 5 horse power raise from a depth of 200 fathoms in one hour?

Yours, &c.,

ALCYTHUL.

West Elizabeth, Allegheny Co., Sept. 15, 1886.

Practical Mining.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you kindly insert the following questions in your next issue?

1. Give the diameter, circumference, width, thickness, weight and strength of round and flat rods (hemp, iron and steel) to wind a weight of 2, 3, 4 and 4 tons.

2. Suppose the water in a deep shaft should rise up above the bucket and clack doors, how would you proceed to change the bucket or clack piece?

3. What kind of hoist would you prefer?

4. Give a rule how to find the increased and decreased volume of air or gas, with the rise and fall of the barometer and thermometer together. Give examples.

Yours, &c.,

STUDENT.

Mt. Carmel, Sept. 20, 1886.

Wants the Diameter.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you kindly allow me to ask some of your able correspondents to give through your valuable paper a correct rule to find the diameter of a shaft. For instance:—Require the diameter of a shaft to pass 116 640 cubic feet per minute, traveling a mean velocity of 10 feet per second.

Yours, &c.,

C. J.

St. Clair, Pa., Sept. 22, 1886.

Various Queries.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you please insert in your next issue the following questions?

1. In opening out a longwall mine with a rock roof, what would be your first consideration?

2. What quantity of air would you have passing per minute in a mine, the shaft 150 fathoms deep, the workings a mile each way from the pit, seam 5 feet thick, fair amount of gas, 300 men and boys employed underground?

3. Give a brief description of what you would do to strengthen pump rods—D wet rods, E dry rods?

4. What will be the pressure per square inch in pounds of a head of water, 360 ft. high?

Yours, &c.,

A. C. S.

Scranton, Pa., Sept. 18, 1886.

HAYES' SQUIBS.

Their Merits Call for Another Factory to Supply the Demand.

The one great desideratum in the perilous life of a miner is a safe and reliable fuse or squib for the setting off of his blasts. Of all the mine casualties of the coal region, the greatest percentage and usually the most fatal are those which flow from premature blasts, or the "hanging fire" of a squib in a charged hole. Various patents have been taken out for the manufacture of a squib that could be depended on at all times to do its work with safety to the collier, but only in rare instances have they stood the test. Changes of weather, atmospheric influences, mine dampness or dryness, with various other causes have

INVENTIONS.

MATTERS OF IMPORTANCE DEVELOPED BY HOME GENIUS.

Among the late patents is one by Julius R. Drodzewski, of Erie, Pa., for a steam-pipe connection between railway cars. It consists of a coupling-joint with a flexible coil of pipe, one end of which connects with the coupling-joint and the other end with the steam-pipes of the car.

A newly patented pump has two air-chambers secured to the plunger-rod, one of which acts to displace water in the lower part of the stock, and the other is located so as to be submerged or enveloped by water in its passage to the outlet. Henry E. Bolton and Theodore Drake, of Dow City, Ia., are the inventors.

A rotary fan has been designed and patented by Peter Murray, Jr., of Newark, N. J., having a hanger-frame suspended from the ceiling, with a driving-shaft and a tubular bearing pivoted to one of the legs of said-frame. The fan is secured to the lower end of the shaft, and is adapted to rotate therewith in a horizontal position.

To John Demarest, of New York city, has been granted a patent for a cistern-overflow valve. It is arranged in combination with an overflow-pipe, and consists of a bell-float surrounded and sliding upon the upper end of said pipe, and a cap resting upon the top of the overflow-pipe. The latter has a perforated rim, against which the float acts in lifting the cap.

There has been patented by George F. Godley, of Philadelphia, Pa., a heating furnace, comprising a cold-air box, and a fire-box composed of a series of tubes communicating with the cold-air box, and contracting with each other for a portion of their length, and separate from each other for the remaining portion of their length. A hot air-drum is located above said tubes, through which passes the smoke-pipe. A jacket surrounds the hot-air tubes, and the cold-air chamber is arranged outside of and around the jacket.

THE OCTOBER OUTPUT.

AN EXTRAORDINARY DEMAND FOR COAL AT ADVANCED RATES.

NEW YORK, Sept. 21.—The allotment committee of the Anthracite coal combination met yesterday at the office of Frederick A. Potts, to determine how much coal shall be mined in October. The committee decided upon 3,250,000 tons. In October, 1885, the allotment was the same, but the companies mined 3,552,166 tons. It is thought probable that the allotment will also be exceeded this year. Last month it was exceeded by 250,000 tons, and this month the amount mined is running beyond the allowance.

The demand for coal is extraordinary and the coal carriers are pressing every kind of rolling stock into service to carry coal to tide water and find it difficult to supply the demand. A further advance in prices is expected. The first of next month. There have been mined thus far this year 21,454,175 tons of anthracite, and an increase of 967,846 tons as compared with the same period last year.

THE VICTIMS OUT.

EVIDENCE THAT THE MARVINE MINERS WERE SUFFOCATED.

SCRANTON, Sept. 21.—Early this morning the news flashed through the city that the working force of the Marvin shaft had been successful in finding the men who a week ago yesterday were cut off from escape by a fall of rock in that mine. An immense crowd of miners and others rushed to the scene and the news was fully confirmed. The men were found, but not in the place where it was supposed they were. The food in their traps and the coffee in the cans were untouched which proves that the fatal gas overtook them very soon after the fall of rock occurred.

They had penetrated the mine to the utmost extremity, where they seem to have sat down, and awaited the approaching gas and the death from which they knew there was no escape. The six bodies were all together, prostrate on the ground with arms folded across their chests. The two missing men were evidently

caught by the falling roof and will be found when the debris is removed. The opinion of those who had charge of the work of rescue is that the men perished within a few hours after the accident occurred.

The bodies, which were in an advanced state of decomposition, were identified, placed into coffins properly marked and sent to the homes that have been made desolate. The bodies found are those of Shafer, Young, McNulty, Carden, Harrison and Murphy. The two still missing are McGuire and Kavanaugh. In order to reach the place where the six were found it was necessary to cut through 150 feet of solid coal.

The Pennsylvania Company.

The report of the Pennsylvania company for 1885 has just been published, showing the operations of the lines west of Pittsburgh controlled by the Pennsylvania railroad company. The labors performed by all the companies included the movement of 14,896,591 tons of freight over a distance equivalent to the movement of 1,397,635,207 tons one mile on the roads of the north western system, and 10,754,990 tons over distances equivalent to the movement of 1,382,095,901 tons one mile over the south western system; a total of 25,651,581 tons, and a ton mileage movement of 2,779,730,808. The number of passengers carried on the north western system was 6,033,791 over distances equivalent to the carriage of 182,250,360 passengers one mile, and the number of passengers carried on the south western system was 4,533,406, the passenger mileage being 145,283,127. The total number of passengers on both systems was 10,567,197, and the passenger mileage was 327,533,487. The net result of the operations of the Pennsylvania company was the transaction of an immense amount of business at rates that involved a positive loss of a little more than \$1,000,000 in addition to the failure to earn dividends on \$20,000,000 of capital stock. The roads represented have, however, furnished a vast amount of traffic to the main line of the Pennsylvania railroad.

Activity in the Coke Trade.

PITTSBURGH, Sept. 20.—The Connells-ville coke and iron company has decided to put down another coal pit, build 500 new coke ovens and erect extensive new works near Leisenring. The proposed enterprise is carrying out a program which the company mapped out some time ago. The members of the coke syndicate have decided to reduce the present output one-sixth by closing the ovens one day each week. There will be no interference with prices at present. It is announced that H. C. Frick & Co., of Pittsburgh, the Union rolling mills, of Chicago, and the Joliet steel company, of Illinois, have formed a huge coke company with \$300,000 capital. Frick & Co. owning a half interest, and the other two companies a quarter each. All the custom of these two firms, which consume one hundred cars of coke weekly, will go to Frick & Co. exclusively. This necessitates the erection of new coke works, and will cause increased activity in the coke regions and insure steady work for a large number of men.

The Pittsburgh Coal Region.

The report of the geological survey of the state of Pennsylvania, in reference to the re-survey of the Pittsburgh coal regions, has the following: "The Pittsburgh region has an outspread of the Pittsburgh coal bed, 50 miles long by 50 miles wide, within the limits of the state. In the northwestern part of this area, the bed is two or three feet thick, increasing in thickness eastward and southward to six feet of good coal at Pittsburgh, ten feet up the Monongahela and twelve feet up the Youghiogheny. What the thickness of the bed is underneath the uplands of Washington and Greene counties, we now know by the new gas wells. It maintains its thickness in that direction. An average of eight feet for the whole region looks like a fair one. This gives 8,000,000 tons to the square mile, and there are 2,500 square miles. Allowing one-half of the area to be interval-separating out-crops, we have then 10,000,000 tons remaining in this one coal bed. Allowing fifty per cent. for pillars, bad mining and waste of all kinds, we may set down its coal for market in the future at 5,000,000,000 tons.

MEN WHO LIVE IN HOPE.

Claims for Millions Pending Before Congress.

Who has not heard of that shadowy assurance, "A Claim before Congress?" and who knows not of that strange mixing up of the bad and the good, by which an equal number of each get through or are buried alive in the archives of committees? There is the McGarran claim, a plea to be heard that McGarran has been pressing for thirty years, and in all that time only missing one day when the committee to which his claim was referred, met, and on that very day it was called and passed over, because there was no body present to represent McGarran. Is not that tragic? Then there is the Kidwell claim, which Senator Ingalls says is ghostly, but which has been haunting the Capitol for many years, and which the Kidwell heirs think entitle them to a vast river front at Washington; and there are Ben Holladay's immortal claims—the Ben Holladay who pays his chief more than any President ever did, and who is the champion after-dinner man of Washington? The Weil and La Abra claim is another of the immortals. The widow of Benjamin Weil wisely sold out her interest and left elegantly in Paris, while the present claimant has been fighting a fight, and all the while hanging to a precipice—to get the great bonanza. Then there is a claim which has slept and waked at intervals for three-quarters of a century, for money due the Pages of Virginia—as at the siege of Yorktown the Americans had virtually no commissariat, and Gov. Page, a millionaire planter, signed his name in blank to requisitions for provisions enough to feed the whole army. The blanks were filled up, and the Page died a bankrupt. One of the most interesting claims upon the record is that of the Meade family, for money due Richard Meade, father of Gen. Meade. As late as the Forty-sixth Congress there was a report on this. It involved about \$300,000, with interest from 1820—quite a snug sum. The claimants say that unless this claim had been guaranteed by the United States government, the treaty with Spain by which Florida was ceded to the United States would have fallen through.

A Solid Old Bank.

The big new building of gray granite in Wall street, New York, owned and occupied jointly by the Mechanics' bank and the Manhattan company brings to mind the device by which the company obtained its charter. Toward the close of the last century a charter was obtained, largely through the influence of Alexander Hamilton, for the Bank of New York, the first bank established in the new republic. The institution was so exceedingly prosperous that the other party, the democrats, were desirous to set up a rival to it. But as their political opponents, the federalists, were in power in Albany they were at a loss to carry out their project until Aaron Burr, with characteristic shrewdness, concocted a scheme to deceive them. He, therefore, in company with his friends, applied to the legislature for a charter to supply the city with water, a provision being added that any surplus capital of the corporation might be employed as was deemed proper. This, of course, served the coveted opportunity.

The Manhattan, organized as a water company, went into banking and has continued to bank ever since, a period of eighty-seven years. It is regarded as one of the solidest and most profitable institutions in the union. The Manhattan, it is said, still owns an old well in Reade street, and any one so minded can compel it, under penalty of forfeiture of charter, to supply him with water. A great many corporations furnish an excess of water to their business, and without solicitation, but the Manhattan is not one of them.

Talk of the Pets.

Elizabeth at twilight teasing for pie. Mamma says: "No, not this morning." Mamma goes on with her work, but soon sees Libbie running a knife between the pie and the plate. Mamma says sharply: "Libbie, what do you think you are doing?" (Libbie) "Just fixing the pie ready for morning." While eating she calls for water. Mamma says: "We should not drink while we are eating." Libbie drops her knife and fork, folds her hands, and says: "I am not eating now mamma." When two years old she pricked someone with a pin. The somebody was nervous and cried; whereupon Libbie pricked repeatedly, and covered her eyes with her chubby hand with the most comical melancholy expression.

There is a new baby on Deer Hill Avenue. It is a small one. Its little five-year-old sister watched it carefully for a few minutes yesterday, and then turned to the maternal head of the family and said: "Mamma, couldn't papa have paid another dollar and got a larger one?"

IN COAL.

GENERAL ITEMS PERTAINING TO THE MINING OF THE MINERAL.

Capt. Johnson will sink a new shaft on the "Flowery Field" track, near Wadesville, Schuylkill Co., Pa.

A charter has been granted to the Renovo Gas and Oil Co., to mine gas and coal in Clinton, Lycoming and Centre counties, Pennsylvania.

The Penn-Mobile coal company, have bought out the Corona mines in Alabama. This organization will make the property of the Penn-Mobile one of the finest in the country.

The new slope at the Girard colliery, Girardville Schuylkill county, Pa., has been given out by contract since the recent strike. All the old outside hands have been re-employed.

The mammoth vein of coal has lately been found at Raven Run, Pa. It was struck on the 16th, at a depth of about eighty feet, and is supposed to be from thirty to thirty-five feet thick and a safe vein for miners to work.

It is said in inventive circles that three gentlemen of Brownsville have applied for a patent on an automatic coal-mining machine which, it is claimed, can cut a 24-foot room in a quarter of a working day. It is reported that \$50,000 has been offered for the machine.

On the 15th 682 mine cars were hoisted at No. 9 breaker of the Lehigh coal and navigation company, Lansford, Pa., and 20 Central cars were loaded and shipped. This is said to be the largest output for one breaker in one day the valley has ever known.

English capitalists propose to improve canal facilities between Belgium and the Scheldt so as to let in smokeless Belgium coal to London, and thence to manufacturing centres. The British colliers propose to see about it. The ground-out employers are in favor of the scheme.

J. C. Wall has purchased 1180 acres of coal land in Marion county, Tenn., 2½ miles from South Pittsburgh. He has six veins of coal, four hard coal and two of good coking coal. One vein shows 66 inches. He is building quarters for miners and will open three veins at once.

The Port Royal coal company, operating one of the largest mines on the Baltimore and Ohio railroad, have reduced the wages of their men six cents per ton for mining. The men are disposed to resist. Another strike, which may spread to all the mines along the Baltimore and Ohio road, is threatened.

Mine No. 3, the largest in Huntsville, Mo., after being idle more than five months, has just reopened on the co-operative plan. The miners are to have the use of the company's machinery and pay the latter a royalty of 1 cent per bushel, retaining for division among themselves the remainder of the profits.

INEXHAUSTIBLE OIL.

ABANDONED WELLS IN THE OIL CREEK REGION FLOW AGAIN.

PITTSBURGH, Sept. 20.—An interesting fact was stated today by officials of the Columbia oil company of this city in regard to some of their oil lands in the Upper Oil creek region. Territory heretofore considered exhausted and practically worthless has recently been tested afresh and some of the abandoned wells are now producing a sufficient quantity of oil to make their operation profitable, even at the present low prices of petroleum. This is taken by experts to demonstrate one of two things. Either that oil is being steadily produced in nature's great laboratory, or that the abandoned fields have secured a fresh supply of oil by seepage from more favored territory.

They incline to think the first hypothesis is the correct one, and that while the rapid development of territory may for a time deplete the stock of oil, nature will promptly rehabilitate the exhausted fields, so that the supply will last for generations to come. They think further that the same theory is equally applicable to natural gas.

There are about 690 iron furnaces in the United States. These turned out, in 1885, over 5,000,000 tons of pig iron.

SCIENTIFIC.

ECHOES AT SEA AND HOW THEY ARE TO BE UTILIZED.

A new method of deter mining the near presence of icebergs on high shore lands, and even ships in a fog, has been devised by Frank Della Torre of Baltimore. The device is based upon echoes, and has been thoroughly tested at Fort Carroll, by order of the navy department. This apparatus consists of a single-barrel breech-loading rifle, provided with a large funnel or speaking trumpet on the muzzle, a box of cartridges and a tripod. The first experiment was made from a tug at a distance of half a mile from the fort. With the discharge of the rifle a distant echo was heard by those on board the tug, without the use of any receiving apparatus other than the unassisted ear. When a boat intervened between the tug and the fort, two echoes were heard, the fainter one coming from the vessel. In favorable weather the echo has been heard four miles. The steam whistle of the tug was also tried, but gave less distant echoes than the sharp report of a rifle. A passing steamer about a mile from the tug gave a very distinct echo. Mr. Della Torre's signal was intended primarily to prevent collisions with icebergs in heavy weather, when it was impossible to be aware of their presence except by means of an echo, but it is equally applicable in advising a ship's officer of the neighborhood of another vessel or other obstruction to navigation.

IRON AND STEEL UNDER THE MICROSCOPE.

The growing importance of microscopic examination of iron and steel is more and more recognized in Germany. Arrangements have been made at the government testing establishment at Berlin to render very valuable assistance to manufacturers, engineers, and others who may desire to make microscopic examination of their materials. The cutting and preparation of the necessary sections is an operation requiring skill and special apparatus. The testing establishment undertakes to prepare sections of samples sent, on payment of certain fixed charges, and what is far more important, Dr. Wedding, the celebrated German metallurgical authority, undertakes to examine all sections so cut, if desired, and to see that they are properly prepared for the special objects in view. Such a system, if fully carried out, cannot fail to be of great value to scientific metallurgy, and to bring about a greatly extended knowledge and use of the microscope.

STRANGE IF TRUE.

The African traveler, Dr. Giovanni Succi, who is at present in his native town, Forlì, claims to have discovered a liquor which renders the human body independent of food and drink. In order to prove his assertion he placed himself under a medical committee who were to see that he took no nourishment for ten days, after having drunk a few glasses of his liquor. At the end of that time, the physician pronounced his pulse perfectly normal, and in order to show that he had not suffered, Succi before breaking his fast, walked from Forlì to Forlino, a distance of four miles, in 47 minutes. He then placed himself at the disposal of the medical faculty of Bologna, whose opinion in the matter is not yet known.

POWER OF RUNNING WATER.

The power which flowing water possesses for transporting or moving stones and gravel over which it runs is very largely augmented by the speed of its flow. This power increases as the sixth power of the velocity; so that a stream flowing six times faster than another will be able to transport 46,656 times more matter.

IN CHIPPING IRON.

To chip smooth after the chip has been started, the chisel should always be held at the same angle at which the chip was started, and every blow of the hammer should be as near alike as possible; then, with common sense and practice, a person can chip nearly as smooth as he can file.

ACTION OF SUGAR ON IRON.

M. M. Klein and A. Berg have been studying the action of sugars on the corrosion of boilers, and find that sugar in water has an acid reaction on iron, which dissolves it, with a disengagement of hydrogen. The quantity of iron dissolved increases with the pro-

portion of sugar in the water. The salt of iron formed is the acetate. A neutral decoction of malt also corrodes iron with the disengagement of hydrogen; but glycerine and mannite are without action on the metal. These results are worthy of note in sugar refineries and places where sugar sometimes finds its way into the boilers by means of the water supplied. The experimenters in question also find that zinc is strongly attacked by sugar; copper, tin, lead, and aluminium are not attacked.

ANIMAL POWER VS. STEAM.

Mr. A. Sanson, in an article in a recent number of the *Revue Scientifique*, states that from a comparison of animal and steam power, in France at least, the former is the cheaper motor. In the conversion of chemical to mechanical energy, 90 per cent is lost in the machine, against 68 in the animal. He finds that the steam horse power, contrary to what is generally believed, is often materially exceeded by the horse. The cost of traction on the Montparnasse-Bastille line of railway he found to be for each car, daily, 57 francs, while the same work done by the horse cost only 47 francs; and he believes that, for moderate powers, the conversion of chemical into mechanical energy is more economically effected through animals than through steam engines.

IMITATING EBONY.

Ebony can be imitated on wood by first painting with a 1-per-cent solution of sulphate of copper. When perfectly dry the wood is painted over with a liquid consisting of equal weights of aniline, hydro-chloride and spirits of wine. The blue vitriol acts on the aniline and forms nigrosin, a black which cannot be affected by acids or alkalis. A luster can be added by coating with simple copal varnish.

A TERRIBLE EXPLOSION.

TEN MEN TORN TO PIECES AND THE WORKS DESTROYED.

CARBONDALE, Sept. 22.—A terrible explosion occurred at the works of the Moosic powder company at Jermyn, about four miles below this city, this morning shortly after 8 o'clock, by which two men lost their lives and one was seriously injured.

Three men were known to be in the press-room at the time of the explosion. They were William Miller, John Wage and Michael Breen.

The latter was discovered soon after the search began. He had miraculously escaped death, but was terribly bruised and internally injured. The body of Miller was found lying beside the railroad some distance from the scene of the disaster. The lower half of one of his legs were broken off, his hair was all singed from his head, and his whole body was charred almost beyond recognition.

The search after the remains of John Wage was very protracted; parties scoured the works in all directions. Some hastily constructed rafts of the demolished timbers of the mills were improvised and the waters of the stream were dragged and searched in every part. For a long time it was thought that the poor fellow had been blown to pieces, but after a long and weary search, the men on the raft at 11 o'clock succeeded in drawing all that was left of the victim out of the water, over 200 yards from the place where the dead man had been working. The flesh was literally shredded from the bones, and the body presented a most awful and sickening appearance. The disaster is attributed to friction in the machinery, but nothing certain has as yet been ascertained.

A Colliery Smashup.

A serious mishap occurred at Gilberton, colliery, Pa., Monday, 20th which probably leaves the place idle for the remainder of the week. When a car of coal was being hoisted the descending cage left the track and knocked out several sets of slope timbers, and closed the slope. The wreck is a most serious one and several days' time will be required to put the place in working order. The colliery employs about three hundred and fifty men and boys, nearly all of whom will be thrown idle until the damage is repaired.

MINING NEWS.

GENERAL GLEANINGS FROM THE FIELDS OF HIDDEN WEALTH.

Lake freights on coal are looking up, and 90 cents has been paid to Chicago from Cleveland.

It is said that a very fine vein of fire clay has been discovered near McKeesport, this county.

Coal found at Natal, South Africa, is claimed to be as good as the best Welsh coal for steam raising.

Referring to earthquake effects it is stated that at the Coosaw mines, Alabama, there is a crack in the earth, 200 feet in length and six inches wide, said to be caused by the quake.

The Carthage land and zinc company, of St. Louis.—D. E. Garrison & Sons—have started a new shaft on their property, with fine prospects of reaching mineral at an early date.

There is considerable exploratory work now in progress on the new range east of Negamun, some of it being on tracks not more than six miles distant from Marquett. The indications are that we will have a couple of shipping mines within half a dozen miles of the city another season, and possibly one closer than that.—*Mining Journal*.

The Florence Mining News announces that Moore & Benjamin, the well-known operators in Gogebic properties, have taken an option for a lease on lots 5 and 6, section 17, 43-31, on which the Caledonia mine is located, and will operate the mine named if their explorations turn out satisfactorily. The ore is a Bessemer and is believed to exist in workable quantity.

The Northern and Pacific management is energetically pushing the construction of new branch lines to serve as "feeders" to the main road. The Cascade division to the Ellensburg coal fields will be ready for business by the first of next month, and will add appreciably to the traffic of the main line. It is expected that from 500 to 1000 carloads of coal will be shipped from the Ellensburg mines daily.

Monongahela and Peters Creek coal company are building a circular coal sieve, which will be driven by steam and so arranged that the slack will be dumped in it as the cars come from the mine. The sieve will separate the small coal into three piles, nut and pea coal and dust. They expect to find a market for the nut and pea, and will throw the dust into the river. Natural gas threw slack out of the market in Pittsburg, and some firms calculate their yearly loss from this cause at \$25,000. If the Peters Creek experiment proves a success part of this money will be regained.

A press telegram from Brazil, Ind., Sept. 10, says: Mining operators and citizens generally indorse the refusal of the miners' federated association at Indianapolis to merge into the miners' assembly of Knights of Labor. The federation was organized last summer as a state affair. In February West Virginia, Pennsylvania, Ohio and Illinois were added, forming a national organization. Its corner-stone is arbitration, nor will it permit a strike till every effort at arbitration through state and national authorities has failed.

Another Body Recovered.

SCRANTON, Sept. 22.—The remains of another of the entombed miners in the Marvine slope were found today a short distance from where the six men were discovered yesterday. This man was buried under a mass of rock which had fallen from the roof, and, owing to the dangerous condition of the mine at this point, it was impossible to secure the body. Another effort will be made tomorrow to remove the rock from the body. No trace has been found of the eighth and last man.

Fatal Boiler Explosion.

SPRINGFIELD, Ill., Sept. 19.—An explosion of the boiler of an engine used in a cider mill near Riverton yesterday caused the instant death of Harvey Elling and Patrick Kelly, workmen, and severely scalded Harry Williams, of this city. Elling's body was picked up 120 and Kelly's 40 feet from the boiler after the explosion.

The movement in the north of England iron trade in favor of restricting the output of pig iron is having serious effects.

MR. GOWEN'S SUCCESSION.

AUSTIN CORBIN FORMALLY ELECTED TO SUCCEED HIM.

PHILADELPHIA, Pa., Sept. 23.—The board of managers of the Reading railroad, in session yesterday in the general office, on Fourth street, received from Franklin B. Gowen his resignation in the following letter:

"I hereby tender my resignation as president of your company and recommend Austin Corbin as my successor." The resignation was accepted and Austin Corbin elected to succeed Mr. Gowen. A meeting of the committee appointed by the reconstruction trustees to formulate the modifications to the syndicate's plan was held after the adjournment of the board of managers. The committee consists of John B. Garrett, John Wananaker, Samuel R. Shipley, Samuel Dickson and Alfred Sully.

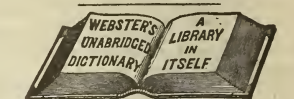
A motion was made in court yesterday by Mr. Gowen as general counsel of the Reading railroad to make Austin Corbin a third receiver of the company.

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TRADE REVIEW.

THE COAL TRADE.

At last we are able to say, and safely, that there is an improvement to note in the anthracite coal trade. The line trade and the manufacturing demands, as reported by the city daily press are equally brisk and give indications of continued activity. From all quarters information is constant that the coal trade is better than at any time previous this year, and that its condition is genuinely healthy. While the calls for supplies are active the stocks on hand are low and under the restricted allotments for October are likely to remain so.

One of the principal reasons given in explanation of the meagre stocks on hand at tidewater shipping points is the large shipments made to the west. Lake navigation closes about December 1st, and all the companies have shipped large quantities of coal west in order to take advantage of the low water rates for transportation. A good supply has already been accumulated at Chicago, Duluth and other lake ports, and more will be sent. The western trade is growing every year, and the companies are doing all they can to encourage it. Interior towns are also using more anthracite than they did, and the demand from these two sources has done more than anything else to keep stocks down. To this may also be added the lack of rolling stock on the railroads to transport coal in accordance with the demand. To meet this last difficulty it is said that the Reading company will shortly have two thousand coal cars built at its shops. As noted in a news item elsewhere the Lehigh and Schuylkill exchange last week advanced prices to take effect in October 1st. It is expected that the Pennsylvania railroad will also advance rates for the coal transported over lines.

The *Public Ledger*, of Philadelphia, says, however, that the Reading company's agents are actively and successfully canvassing the line and city trade, and that orders for several hundred cars of coal were secured at September prices, to be delivered this month at those rates in the event of inability to ship the coal before the 1st instant.

The principal, and in fact the only important objection to the October advance in prices, at the late exchange meeting, was the representative of the Lehigh Valley coal company, who said that an advance at this time was ill-advised, and that if the circular rate were obtained the price would be quite high enough. He did all within his power to impress this upon the other representatives, but when the vote was taken all but the Lehigh Valley coal company voted for the advance. The Lehigh Valley representative, however, declared that his company would abide by the decision.

The total amount of anthracite coal sent to market for the week ending September 18, as reported by the several carrying companies was 707,599 tons, compared with 767,452 tons in the corresponding week last year, an increase of 59,853 tons. The total amount of anthracite mined thus far in the year '86 is 21,761,774 tons, compared with 20,853,781 tons for the same period last year, an increase of 907,993 tons. The following statement gives the gross tonnage of each of the leading coal carrying companies for the week ending September 18, and for the year to same date, compared with the respective amounts carried to the same date last year.

	Week	1886	1885	Difference
Reading R. Co.	302,834	9,915,561	9,426,356	1,489,203
Lehigh Valley	139,497	4,579,182	4,634,798	1,344,384
D. L. & Western	109,989	3,421,272	3,223,038	1,198,234
Shamokin	13,063	588,799	683,282	1,014,483
Ind. R. N. J.	43,730	1,146,658	1,171,700	2,254,042
Penna. Coal	33,883	1,001,759	869,991	1,041,768
Del. and Hudson	82,546	2,837,536	2,542,462	1,295,074
Pa. and N. Y.	41,935	1,112,200	1,198,084	1,214,124
Clearfield Pa.	45,470	1,501,642	2,050,118	1,054,478
Hun and B. Top.	10,725	474,321	438,613	35,808
Nor. and Wta.	15,383	597,586	402,453	1,195,133

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Sept. 18 was 302,065 tons, of which 227,001 tons were coal and 75,064 tons coke. The total tonnage for the year thus far has been 10,573,063 tons, of which 8,160,809 tons were coal and 2,422,254 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending September 25, was 311,000 tons, of which 34,000 tons were sent to and 38,000 tons shipped from Port Richmond, and 31,000

tons were sent to and 34,000 tons shipped from Elizabethport.

The shipments from the mines of the Cumberland coal region for the week ending Sept. 18 were 67,769 tons, and for the year to that date 1,609,105 tons, a decrease of 358,555 tons as compared with the corresponding period of 1885.

IRON TRADE.

The events of the past week were decidedly favorable to the iron trade. The demand has been very heavy, and while no general change in price has been made, the tendency is steadily towards higher figures, while an average of the week's transactions would show probably twenty-five cents more per ton on pig iron, \$1 to \$1.50 on puddling bars, and from \$1 to \$2 advance on finished iron. The most encouraging feature, however, is the steady increase in demand and the large amount of work that has already been distributed around among consumers. There has been no time for years when there was such general activity as at present, and with a slight improvement in prices profits ought to satisfy every one.

Chicago.

From the Industrial World.

The situation of the coal market is very much the same as was noted last week. The demand for all kinds of coal is very large and widely extended. The leading feature of the trade, and that most talked of on the street, is the continued scarcity of cars for transportation from the east. Hard coals are especially difficult to obtain. Dealers who usually receive from 30 to 50 cars a day, at this time of the year, have not averaged three cars per day since the first of the month. Bituminous coal shippers are more fortunate, and are able to supply their customers with very little delay. Receipts by Lake are also comparatively light, because of the scarcity of coal on the dock at eastern points. Lake freights are firm at 75 cents from Buffalo.

The receipts of Anthracite from Sept. 1 to Sept. 10, were 37,275 tons, against 46,740 tons in 1885, showing a decrease of 9,465 tons. Consequently shipments to the west are extremely light, showing a decrease of 19,454 tons from last year's figures for the first ten days of this month. The demand is large and prices are very firm. There is an unusual scarcity of small egg. Card rates are being strongly held up, and the cutting of these figures, which was so noticeable two months ago, has entirely disappeared. More business is being done in soft coals, and the movement of the same into the country is heavier. Shipments, although not as delinquent as Anthracite, are somewhat light. Values are fairly steady, but no change in card rates has been made.

Cannel coal is coming into a little more favor, and the movement is rather more extended. Shipments of coke are lighter than at this time last year, by 2,940 tons for the first ten days of this month. No change in quotations is announced, and prices are about steady at card rates.

The charcoal market has shown some improvement.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.

	Per net ton by carload.
Grate.....	\$5 25
Egg.....	5 30
No. 4.....	5 50
Nut.....	5 75
Lehigh Lump.....	6 50
	7 20

BITUMINOUS.

Erie & Briarhill.....	\$4 15
Pittsburg.....	3 20
Indiana Block.....	2 40@2 60
" Slack.....	1 25@1 35
" Nut.....	1 65@1 80
Baltimore & Ohio.....	2 75@2 90
Hooking Valley.....	2 75@2 90
Youghiogheny.....	3 20@3 30
Wilmington.....	3 10
Blossburg.....	3 25
Cumberland Smithing.....	3 25
Sonoma Smithing.....	3 40
Grape Creek.....	2 00
Fountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Minonk.....	2 00
Morris.....	2 00

CANNEL.

Buckeye.....	4 50
Kanawha.....	4 25

COKE.

Connellsville Coke.....	4 75@5 00
Crushed Coke.....	5 50
Charcoal, carload per bu.....	8 50@1 00

Pittsburg.

From the American Manufacturer.

Prices in the Ohio and Mississippi river markets are firmer on account of the continued suspension of navigation, but not notably higher. Work at the mines along the Monongahela is still of a very limited character. At the railway mines the situation is about the same, whether as regards prices or product.

PRICES AT PITTSBURG.

River, wholesale, on board.....	3 30@4 1/2 cts. per bushel
Railroad.....	4 1/4@4 1/2 cts. per bushel
AT CINCINNATI.	
River, wholesale, on board.....	5 1/2@6 1/2 cts. per bushel
AT LOUISVILLE.	
River, wholesale, on board.....	5 1/2@6 1/2 cts. per bushel
AT NEW ORLEANS.	
River, wholesale, on board.....	25@26 1/2 cts. per bbl.

Bushels are rated among dealers here at 76 lb.—26 1/2 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke—At a meeting of the coke operators a few days ago it was decided to draw the ovens five days per week, instead of six, as formerly. There is a constant increase of productive capacity in the region. The prices for October have been fixed. They are the same as for September, nearly: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed; \$2.25.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Sept. 25, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	62,848.11	1,600,758.19
Shipped South.....	62,541.00	1,945,903.01
Total.....	125,389.11	3,545,661.90
For corresponding time last year.		
Shipped North.....	73,623.15	1,589,055.12
Shipped South.....	48,998.07	1,756,064.14
Total.....	112,622.02	3,345,660.96
Increase.....	2,767.09	201,001.14
Decrease.....		

John Inman and Southern Iron Industries.

The most important fact for this section brought by last week's telegrams was John Inman and his associates had made a large investment in Birmingham. The scheme involved in this investment is a gigantic one. It will require \$4,000,000 in cash. Besides running the immense furnaces and mines already in the property, four new coal furnaces and a new Bessemer-steel furnace will be built and three new coal mines opened. The mere fact, however, that Mr. Inman has staked so large an amount on the future of southern ironmaking is more important than the material improvements that come with the investment can possibly be. There is no man in this country who has the confidence of investors in north and south alike to equal extent with Mr. John H. Inman. His command of money in New York is almost unlimited. His following in the south is as large and quite as earnest, if not so heavy. From Galveston to Richmond he could command the unbroken support of the best, most liberal and progressive elements of the south, and nowhere to fuller degree than in Atlanta. It is curious to recount what he has done in the way of developing southern interests. He invested nearly \$2,000,000 in the Tennessee coal and iron company; he is one of the strongest directors in the Louisville and Nashville railway system; he is the moneyed power back of the Macon and Covington road; he loaned the Georgia Pacific company \$250,000 when it was in straits, and afterward took about \$2,000,000 of its bonds; he is a director and leading influence in the Richmond and Danville railway system; he took the entire loan of Atlanta 4 per cent, and made the first bid for the Georgia state loan of \$2,140,000; he has over \$200,500 invested in Atlanta real estate and securities, and now lays an investment of \$4,000,000 at the gates of Birmingham. What a miracle of courage, sagacity and success his career has been! Less than twenty years ago he went into New York a rebel boy, in an antebellum suit, which had not been put where moths do not corrupt, and less than \$100 in money and property. He has now a fortune of several million dollars, is director in institutions that aggregate more than Vanderbilt's wealth and has been instrumental in having brought into the south more millions than he had dollars when he left her, bearing nothing but the knight-hood that she laid with loving hands on his well-worn cap of gray.—*Atlanta Constitution.*

IN THOSE mining districts of Scotland where the 6d. per day advance which many of the miners began to receive on the 1st of last month has not yet been conceded the men are manifesting much dissatisfaction is given greater force to a federation movement which has a rather big look about it. A conference of delegates representing some 40,000 or 45,000 miners came off in Glasgow a few days ago. The reports presented showed that the working time was very generally restricted to eight hours a day; that in many districts the men were working only five days a week; and that over a large portion of the mining districts the 6d. advance had been conceded. The conference determined to form "The Scottish Miners' National Federation," to act as a central board for the whole country, and notice was given that at a future meeting a motion would be proposed to memorialize the unions of England, Wales and Ireland to call a national conference to discuss the questions of restriction and wages.

CONCENTRATING OF ORES.

Matters That Require Consideration Before Investments Are Made.

The present season, says the *Denver Tribune-Republican*, is prolific in the establishment of new concentration mills. There is scarcely an important camp where is not promised one or more of them. The process man is getting in his work in good shape, and the talkative humbug, who professes to be a "practical mill man," is not at present out of a job. It is in milling as it is in mining, let some poor prospector make a big strike and leap at once from poverty to wealth, and prospecting receives a great impetus, and grub stakes become plenty. So let some one mine obtain a concentration mill and find it a source of great profit, and immediately every man in the country must have a concentrator. If "Mulberry Sellers" can make big money out of a concentrator, why can't the "man in the moon," thinks the owner of the latter impecunious claim. The process professor and practical mill man say there is no earthly reason why a lot of money should not be made, and urge the construction of a mill. The capper for the process man gets in his word when it will do the most good, and the salesman who gets a commission from machinery manufacturers adds his influence. An expert is selected, an examination is made, a favorable report is returned, the money is subscribed, the mill goes up with a flourish of trumpets, the local papers prophesy great success, and things boom, and everybody is happy so long as the expenditure of money is continued. The mine-owners are capped into the employment of some lunk-head or scoundrel as an expert, and the whole thing is less than a bunco game. The mill fails, debts, sheriff, sale, ruin; these are the words that tell the story, which apparently is to be continued without end.

Among all the problems concerning the treatment of ore, there are none so surrounded with more difficulties than concentration. It is considered the simplest, but is the most difficult. There is, comparatively, little ore which is well suited for concentration by mill processes, and judging from past results there are few experts who are competent to tell whether or not any particular ore is suited. The errors that have been made in that branch of ore treatment would be laughable were they not such a lamentable evidence of human credulity, and ignorance. We have known mills to be erected for the concentration of ores whose value was in the light gauge, and the concentrates produced were worth less than the ore before treatment. We have seen mills erected to work on ores whose gauge was baryta and whose value was a sulphuret of silver or gray copper, and men who revealed in the title of metallurgist said the scheme was practicable. We have known of one company in southern Colorado expending over a half a million dollars trying to concentrate a galena ore, when the pure galena was worth only \$40 per ton, and when they succeeded they wondered why they could not get high-grade concentrate.

It is altogether a practicable and not costly to determine whether an ore can be concentrated profitably by any milling method, and when this is ascertained there is an abundance of opportunities for determining what particular method, if any, is best suited to the ore, without going to the expense of erecting a costly mill. An ordinary amount of care and study of the subject will prevent any man from making mistakes in the erection of a concentration mill; that care and study, however, must be rightly directed, and "there is the rub."

Selecting Graphite for Lubricating.

It is very desirable, in giving orders for any kind of mechanical goods, to specify what is wanted as definitely as possible. Sometimes—indeed, very often—the buyer who knows exactly what he wants the article to do is in doubt just what to select. This is a common circumstance in ordering a lubricant. If the seller is reliable (and there are few John Finks in the trade), he will help the buyer to select the correct article for the purpose. Probably there are more blunders made in ordering graphite for lubricating purposes than in selecting oil. There seems to be but a limited public knowledge of graphite, which is also known as plumbago and black lead, the same substance being called these three names. In a recent conversation with Secretary Walker, of the Dixon crucible company, he said: "I was in an engine-room the other day, and asked the engineer whether he used graphite as a lubricant. He answered, 'No; he used a black lead.' 'What is a graphite?' he continued. The fact is graphite (or plumbago or black lead) is useful for scores of different purposes, and is scientifically prepared by this company for each special use. For one, it must be absolutely pure; for another, purity is a non-essential. For a third, it must be reduced to an impalpable powder; but, for number four it is needed in a coarse flake. One-third of our orders, however, simply say—send us so many pounds of black lead, leaving the company to speculate as to what is wanted. The superintendent or master

mechanic of a large plant learns in a general way of its value. He decides to try it. Without stopping to learn whether the miners and manufacturers may or not have prepared a special grade for different purposes, he sends usually to the nearest mill supply store for some "black lead." He gets it. Six cases out of ten, it is not what he should use. It has been bought by the mill supply firm in ignorance of the scope of the article, and chiefly on account of its price. The result can be predicted. The trial is unsatisfactory. The particular black lead which caused the failure is not only condemned, but the principle of lubricating by the use of graphite has received a "set back." Nevertheless, the graphite industry is a growing one; its position as a lubricant is assured. It will be the solid anti-friction agent of the future."—*American Machinist*.

ELECTRIC LIGHTING.

Important Improvements Towards its General Domestic Use and Comfort.

There are many evidences that the use of the electric light for domestic purposes is on the increase, if but slowly, and many country mansions have for some time past been lighted with incandescent lamps, the cost and trouble of which is found to compare favorably with that incidental to the use of oil. But while progress has been made it has chiefly been on a scale too large and expensive to admit of the light being adopted upon a similar basis for ordinary residences. A great lack has existed in the absence of an effective motor. Gas-engines, when worked with accumulators, have done good service, but in districts where gas is dear the cost of working is to great an item to favor their use, whilst, on the other hand, a high-pressure steam-engine and boiler, which would in a great majority of cases have to be attended to by a comparatively unskilled man, such as a gardener, is by very many not to be thought of, leaving out of the calculation the cost of fuel, the extra cost of insuring the premises, and the nuisance arising from the smoke. As an instalment to the solution of this difficulty Mr. Henry Davey has invented a new form of motor which possesses sufficient merit to warrant attention, and what can be done with it will perhaps be best described by shortly detailing the features of an installation at Mr. Davey's private residence.

The type of motor used is that commonly known as the "hopper" boiler. The furnace is filled up with coke, a single charge being sufficient for six or eight hours. The boiler stands in the open yard, and is coated with silicate cotton, the whole being enclosed in a thin sheet-iron casing.

The motor itself is of three horse-power (nominal), and stands together with the dynamo in a small wooden shed close to the boiler in the back yard, the total space occupied by motor, dynamo and boiler being 12 feet by 6 feet. The motor is claimed to be highly efficient, whilst an explosion with it is said to be impossible, no matter how long it might be neglected; and it has been satisfactorily demonstrated that the cost of working does not amount to more than one-fourth that of the gas-engine.

It is capable of driving twenty lamps or 16 candle power each, and for the last eighteen months this number of lamps has been driven direct, and, in addition, the motor has supplied steam for warming the house. Recently Mr. Davey added accumulators so as to be able to illuminate the whole house at one time if required, and also to be able to dispense with the necessity of running the motor more than about once a week in summer for charging the accumulators. In the winter time the lighting is done direct with the accumulators in parallel, so that the latter are always kept fully charged.

An automatic damper has been applied to the boiler, so that when the dynamo is not running and absorbing power the damper is almost closed, and combustion takes place so slowly that, as a rule, the fire does not go out at the end of twenty-four hours, and a fresh addition of coke is only required once a day. The fuel used is ordinary gas-coke, the consumption being in winter about 1 cwt. per day. This result closely coincides with the official trial of the motor made by the Royal Agricultural Society last summer.

The cost of an installation of this kind, without secondary batteries, would be about 200l., or with secondary batteries 250l. A great advantage of the whole thing is that it can be worked by any laborer, and without, as previously remarked, the slightest risk of explosion. In proof of this latter it is stated that a large bank at Leeds, which was lighted during last winter, the motor and hopper boiler driving a dynamo direct, were placed in the basement beneath the principal office, and were solely attended to by the servant of the bank, who had no previous knowledge of machinery.—*London Iron Monger*.

Judge Simonton decided that the sale by the sheriff of Lehigh county of the property and franchises of the Pennsylvania and New England railroad company to the Susquehanna and Delaware River railroad company is legal, and passed a valid title to the property and franchises levied upon.

STILL A MYSTERY.

Engineer and Scientists Baffled by Iowa's Overflowing Well—A Layman's Diagnosis of the Case.

So far but little has been said to account for the phenomenon of the great flowing well at Belle Plaine. A state university professor has visited the well, and has hazarded the guess that it is fed from Lake Benton, Minnesota. This is ingenious, and has some basis of probability. But it is just as well to consider some physical facts in connection with the well.

Take a pack of playing-cards and push them so that an edge of each will lap past its upper fellow. This will illustrate the rock formations of Iowa when looking west from any point in northwest Iowa. The lower card represents the Trenton limestone, while half a dozen cards above it can stand for the lead-bearing and Niagara series. Cedar Rapids rests well forward the top of the latter group, while Belle Plaine, thirty-five miles west, probably lies on the thin layer of Devonian rock, which is scantily exposed in Buchanan county. It can be stated as a fact that the Niagara rocks are full of fissures and small caverns. Whether this be true of the rocks underlying Belle Plaine can only be inferred on the action of the various artesian wells at that place, but this would seem to be competent evidence that the cavernous condition of the rocks still prevails at that place.

According to the chart of the Iowa railway commissioners Belle Plaine station is 554 feet above the ocean level. The surface surroundings of the place do not warrant the hypothesis that the source of supply of its great well is near at hand. But by reference again to the railway commissioners' chart it will be seen that the Iowa river, which runs not far from Belle Plaine, has a long and tortuous course nearly to the north boundary of the state, and the Milwaukee railway station at Britt, where the Iowa slips over the prairie, stands in altitude 359 feet higher than Belle Plaine.

But the Belle Plaine well is said to be 185 feet deep. Probably, if it could be piped, the water would rise say two hundred feet above the bottom of the well. Now if the well is fed from Lake Benton, Minnesota, as the Iowa City scientist assumes, according to a well-known law of hydrostatics the Belle Plaine people would have more worry even than now, for Spirit lake, Storm lake, and Lake Benton all lie approximately 1,500 feet above sea level, or, say, 750 feet above the bottom of the Belle Plaine spouter. Hence, instead of merely gushing out, the water would have a geyser-shoot upward of hundreds of feet. The Iowa City theory does not work any better than the cone that went into the well Sunday.

The only tenable theory in the light of present facts is that the Belle Plaine well is fed from a leak in the Iowa river—or possibly from the Cedar for that matter. And if it is water from the Iowa that has found a long fissure affording a subterranean waterway under Belle Plaine it has found that fissure somewhere in Marshall county, which satisfies the conditions of the case. For the Iowa river has a fall of about 85 feet between Marshalltown and Belle Plaine. Add this 85 feet as a pressure-head and it will, after allowing for waste by leakage and friction, supply the power that pushes the water into Belle Plaine's streets. But if it is the Cedar that is leaking at such a rate through the well the weak spot is somewhere above Charles City, say about the state line.

It might be urged that the leakage from showers conveyed through the soil would answer the conditions, and in connection it would be said that the gravel-beds along Iowa streams, all of which lie above the Belle Plaine well, would afford the great supply spouting out. But if this were true the manner of the origin of the well would be the same considered scientifically.

It is but fair to mention while discussing the latter view that southwest Wisconsin affords some wonderful springs. A single spring runs a flouring mill at Springville, Wis., while six miles away in early times another noble fountain used to run a saw mill. These springs burst out within three hundred feet of the highest altitude between the Mississippi and Wisconsin rivers, and the watershed for their supply is very narrow. Fayette county, Iowa, affords some wonderful springs with quite as limited areas of supply as those in Wisconsin. These springs certainly depend on melted snow and rains, but they bubble gaily all the year around, with little variation in the amount of discharge. These springs justify the view that the water runs through rock fissures, and so the view is here fully maintained that the bed of the Iowa river needs patching in Marshall county, and when patched the Belle Plaine folks will get their well under control.

SAFETY LAMPS FREE.

Every mine boss should possess a good safety lamp, even if the mine does not give off fire-damp. There is no telling when it will make its appearance, and a safety lamp may be wanted at any moment for purposes of investigation. Any person sending us five new yearly subscribers and the money for the same, can have Williams' improved safety lamp, or the Boss' pocket safety lamp sent free.

MINE FOREMEN.

The Method of Legal Procedure for any Violation of the Statute—A Discretionary Power Lodged Somewhere.

A correspondent writing from Freeland, Pa., to the Hazleton *Sentinel* and claiming to be a "miner of thirty years" experience asks information concerning that section of the mine law relating to certificated foremen. In his communication he refers to an alleged breach of the law. The *Sentinel* quotes from the mine law three sections in Article VIII covering the information desired:—

SECTION 1. From and after the first day of July, one thousand eight hundred and eighty-six, no person shall be permitted to act as mine foreman, unless he is registered as a holder of a certificate under this act.

SEC. 6. No mine shall be operated for a longer period than thirty (30) days without the supervision of a mine foreman; *Provided however*, That any mine employing ordinarily less than ten (10) persons underground, or one whose daily output is less than fifty (50) tons of coal shall be exempt from the operations of this section.

SEC. 7. In case any mine, except as hereinafter excepted, is worked a longer period than thirty (30) days without such certificated mine foreman, the owner, operator or superintendent thereof shall be subject to a penalty of twenty dollars per day, for each day over the said thirty (30) days during which the said mine is worked, unless it shall be clearly shown that the said owner, operator or superintendent has used all reasonable means for the enforcement of this article, and to prevent the mine from being worked contrary to this act: *And provided further*, That in case no suitable or satisfactory certificated mine foreman may at the time be obtained, some suitable person may be appointed to act as mine foreman for the space of three months, or until such person can obtain the proper certificate under this act.

The first section has no reference to operators and in the light of a legal opinion, its restrictions are largely softened by the seventh section. Section 6 is explicit enough, but it is also tempered by the peculiar wording of the next section. Section 7 conveys the intention of the mine commission as far as the period of limitation is concerned, but at the same time it clothes somebody with discretionary power in the premises. If any operator or mine owner has used reasonable means to enforce the act and finds his aim frustrated by any inability to obtain a properly qualified person, or having secured such person finds him intemperate or neglectful of his duty, he cannot be convicted under the act of any violation of its provisions for operating his mine without a certificated foreman. Thus it will be seen that the thirty day limit is subject to extension, is rendered somewhat indefinite by the proviso of this seventh action. What constitutes a "suitable or satisfactory certificated foreman" under the law? It is evident that the certificate itself is no *prima facie* evidence that the holder thereof is a suitable or satisfactory foreman or the provision would not be worded as it is. It is evident from this proviso that a discretionary power is lodged somewhere in judging foremen and we are at loss to know whether it is to be exercised by the operator, the mine inspector, or the judge of the county court.

The only way of ascertaining an operator's responsibility under this section of the mine law is for the mine inspector to lodge a complaint for violation of section 6 before one of the judges of the county court. Acting on this information the said judge will issue a warrant to the sheriff of the county and thus cause the arrest of the operator or mine owner charged with a violation of the law. It will be incumbent on the mine inspector in such a prosecution to prove that the mine was operated for a longer period than thirty days before the defendant need open his case. The statute being a penalty one, that is having a penalty for a violation of any of its provisions, it must be construed strictly. Should the mine inspector prove that any mine was worked for a longer period than thirty days without a certificated foreman, it would then devolve upon the operator or mine owner to show that he had used all reasonable means to comply with the mandate of the law, or that he had been unable to secure the services of "a suitable or satisfactory certificated foreman," and was thus compelled to appoint another not legally qualified to superintend the mine. This method of procedure would result in establishing the qualifications of a mine foreman other than those vouched for in a certificate.

The cases cited in the communication do not show a violation of the law. Two foremen quit work in their positions or were transferred to other places on September 1st., and persons not certificated were appointed to do the work. It will be seen that the thirty days mentioned in the act have not elapsed in this case, and no complaint can be lodged before any judge of the county court. If such persons continue to act as mine foremen after the first day of October, it is the duty of the mine

inspector to lodge the complaint as stated. We trust we have made the subject clear to the miner of "thirty years' experience" and his comrades in the mine.

The American Project for Persian Railroads.

The American speculator who has obtained the concession from the shah for the construction of a network of railways in Persia, would appear to mean business, after all. The concession, which he obtained while acting at Feheran as minister-resident of the United States, he has conveyed to St. Petersburg, and offered to carry out under the direct auspices of the Russian government. British diplomacy at Teheran is reported to be much exercised by this act; and if we are not mistaken, influence is being brought to bear upon the shah to induce him to clip the wings of the concession, if Mr. Winston realizes his present aim of transferring it to Russia for a cash consideration. England has acquiesced in a good many Russian movements lately, but we question whether she would regard with indifference the extension of the Russian railway system from the Caucasus to the Persian gulf. This is what the American proposes to do; and as, by the terms of his ninety-nine years' concession, he obtains mile-plots of land each side of the line through the richest provinces of Persia—those bordering upon the Caspian sea—the initial section, from the shores of that sea to Teheran, is almost sure to pay. Afterward it is proposed to carry one line south to the Persian gulf, on which Russia has long aspired to establish a naval station, and another east to Meshed, whence a short extension would carry it on to the Russian railways from the Caspian to Mery. These two main lines would completely open up Persia, and at the same time link her fortunes altogether with those of Russia, who, from the Caspian, would be able to dominate both railways. Mr. Winston proposes that Russian engineers should construct the line, Russian tracklayers lay it, and the metals and rolling stock be obtained from the railway works at St. Petersburg, Kolomna, Briansk and the Ural mountains.—*Engineer*.

Relief From a Private Car.

The Denver News says: "One of the most generous and commendable acts that has recently been recorded of a wealthy gentleman traveling across the country in his own special cars was that of Jesse Seligman, of New York. When the train reached the washout which occurred on the Rio Grande road, near Castle Rock, it was brought to a standstill and there held all the afternoon and way into the night. There was no place to feed and no place where food could be obtained. Banker Seligman and his party were well provided for, having their own sleeping car, their dining car and a good store of provisions, which had been laid in at Denver. The passengers on the regular train, however, were not so fortunate, and as there were many ladies the situation began to look rather blue. Pullman Conductor A. J. Ricketts, taking in the situation, went back to the banker's party and told them that there was a number of ladies on the cars who were in need of food and drink. It did not take the banker long to answer, and his answer was "Go and set your tables and I will provide the food." And he did, and he did handsomely. He set his cooks and his servants to work and cooked up a bountiful supply of everything he had in store. His provisions were brought out in such quality and quantity as to surprise all, and the passengers feasted on the banker's meal. But he did not stop here. After feeding all the passengers, he turned to the railroad laborers, who had been working manfully to repair the damage done by the storm. To these men he sent his servants with large servers piled heaping full with the good things he had in store, and every laborer was waited upon by the banker's servants and served up with a good lunch. The train afterward was compelled to return to Denver and await the repairs of the road, and with it came the testimony of all on board of the good heart and splendid generosity of the banker."

Large Coke Plant.

It was stated lately that H. C. Frick & Co., the Union rolling mills, of Chicago, and Joliet steel company, Ill., had formed a huge coke company with a capital of \$300,000, that Frick & Co. own a half interest in the concern, and the other two companies a quarter each, but it now appears that there was only the reorganization of an old company, and that the company is building no new ovens at present. Work on the proposed three hundred new ovens at Mammoth has been commenced. The standard works of the Frick coke company will number one thousand ovens when the new ovens now under way are completed. It will then be the largest single plant in the region.

Bentley & Knight, of the Rhode Island locomotive works, have constructed for the underground railway of New York, an electromotive engine, which is said to be the largest electro-motor yet made. Two electro-motors coupled together give a joint power of 500,000 watts—equal to 670 horse power. All the ordinary electrical appliances are employed on this engine, working automatically. The convenience of electricity for underground railways will now be demonstrated.

PETROLEUM.

The Supply of the Oil Known to Exist in Foreign Territory.

The petroleum wells, near Ragoon, in British Bumah, have been considerably developed recently, the production for 1884 having been 404,000 gallons. The largest works in the Kyoukpyu district are owned by the Doronya oil company. Of the twenty-four wells there are nine in operation.

The report of Jos. M. Jones, the expert sent to examine the alleged petroleum field of Egypt, says in effect that it will be many a long day before a reliable supply of petroleum will be found at Suez. He says: From Jebel Zeit to the end of the Jebel Esh range there is a run of pretty uniform ground, say 40 miles long by 5 to 12 miles in width, all of which strata bears equally good indications of surface oil is proved beyond a doubt I would remark that that fact is one the value of which may be very easily exaggerated. The existence of surface oil may or may not be an indication of the existence of quantities of oil at lower strata—the chances are about equal—but the quantity of surface oil is no indication as to the quantity of well oil. I feel convinced—and Mr. Mitchell (the government geologist), together with others there, shares my conviction—that the surface oil in the place where struck is exhausted. M. Deby states that he checked the supply. I venture to say that the supply has exhausted itself, and I base this opinion *inter alia* upon the simple fact that he is boring through the identical shaft where he found petroleum. I am further of opinion that the indications are sufficiently favorable to justify the preliminary expense of borings, but they will always be of a speculative character; and I would venture to suggest that they should be made in several places until a *bona-fide* strata is reached, that they should then be plugged, and from the number of successful soundings made it will then be possible for the government to judge as to the advisability of working, in which case, but not till then, reservoirs, means of transport, and refineries will become necessary. The diamond-boring apparatus, in which I am personally interested, would, though expensive, in my opinion, place the question so rapidly beyond doubt that it would be cheapest in the end. An expenditure of 6000*l.* to 10,000*l.* in six months would be necessary. It might be perfectly fruitless. It might indicate the source of enormous wealth. A lesser amount spread over a longer period might suffice with hand-boring, but I feel convinced it would not be equally satisfactory.

Vice-Consul Peacock, of Batoum, thinks the time will come when British capitalists may find it worth their while to look at Russian petroleum; but with kerosene (crude oil?) at less than a farthing for five gallons the time is not yet. Mr. Chas. Marvin, on the other hand, has satisfied himself that the omens are auspicious now; and he bases this opinion on two facts—(1) the Paris Rothschilds have ordered 300 tank wagons to convey oil to Batoum from Baku, and (2) a Belgian firm—Cockerill—has offered to lay down a pipe line from Baku and the sea.

Exports of mineral oils for the month of August reported by the bureau of statistics compared with the same month of 1885 were as follows:

	August, 1886.	August, 1885.
Crude oil.....	6,271,495	7,863,474
Naphtha.....	1,538,578	90,165
Illuminating.....	38,559,639	42,239,180
Lubricating.....	1,179,849	1,059,791
Residuum.....	1,008	377,412
Total gallons.....	47,550,509	52,505,008
Total values.....	\$ 3,778,105	\$ 4,576,504

For eight months ending August 31, 1886, compared with the same period of last year, such exports were as follows.

	1886.	1885.
Crude oil.....	44,447,632	50,086,793
Naphtha.....	6,557,256	8,917,976
Illuminating.....	318,025,123	301,736,026
Lubricating.....	8,868,626	8,767,662
Residuum.....	1,367,100	4,484,634
Total gallons.....	377,065,737	373,993,091
Total values.....	\$ 31,180,990	\$ 31,701,636

These figures indicate a temporary check in the export trade. They are nevertheless sufficient to show the utter fallacy of a statement going the rounds that the production of Washington county, Pa., alone is more than the consumption of the whole world. Washington county in August did not produce 20,000,000 gallons of oil, and there were more than twice that amount exported, to say nothing of the consumption of the United States. It is singular how a story once set going will be repeated unthinkingly.

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-AT-

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FOR THE WEEK ENDING

SATURDAY, OCTOBER 2, 1886.

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THE BUSINESS REVIVAL.

Whatever doubts may have been entertained by the public regarding the genuineness of the revival of general business which first began a year ago, and two months ago developed into a veritable boom, ought now to be dispelled. Information from all parts of the country regarding the condition and prospects of trade and business is uniformly hopeful and encouraging, and in not a few cases the improvement has been surprisingly great and the outlook for the future exceedingly bright. The volume of commercial transactions exceeds largely at all commercial centres totals at like periods in immediately succeeding years, and on the whole exceed perhaps the most hopeful anticipations of two months ago. The manufacturing and producing interests are busier than at any time in the past four years, and at no time during that period was the outlook as bright as at present. The railroads are all busy, the traffic of some of them, especially the coal roads, being limited only by their facilities for transportation. The average increase in railroad earnings for the nine months just closed, as compared with a like portion of 1885, is about 8 per cent., obtained mainly from increased traffic, as neither prices or freights have advanced greatly.

This latter condition of things is reflected in the condition of the stock market, which has been surprisingly strengthened within the past month. Reading has been a central figure in the market since the agreement between the conflicting interests in the road have been reached and a plan of reconstruction decided upon. Whether the compromise will justify all that is expected of it, or indeed the advance it has already caused, remains to be seen, but the popular view appears to be that Reading is on the way of being lifted from the slough of depression in which it has floundered during the past ten years and placed on a firm basis. How this is to be accomplished has not yet been fully explained, but those who know the plans appear to have abundant confidence in them. If this can be accomplished it will prevent the demoralization of the coal market, which Reading's financial straits so often threatened.

The revival of business is now a fact, and to most people's notions perhaps this is all sufficient. There are many persons, however, who are given to studying cause and effect, who will be delighted with the revival of industry and the generally promising business outlook, but who would still like to know what the causes are that produce this effect. There can be no doubt that the revival is due to a combination of circumstances. Neither can there be any doubt that it has been delayed somewhat by the attitude of congress on the tariff and currency questions. The proposal to suspend the coinage of silver, had it been put into effect, would have contracted the volume of the currency, and instead of a revival of trade we should now be experiencing a shrinkage of values and an aggravated stagnation of business. Since the adjournment of congress the treasury department has called \$45,000,000 of 3 per cent. bonds, and the currency has been somewhat expanded by disbursements in consequence thereof. This has inspired confidence, and speculation has taken a fresh start in the belief that the country is starting upon a period of unexampled prosperity. And it may be added that the indications justify the conclusion. Prices may not advance rapidly, but that we are entering upon a period of industrial activity is already demonstrated.

The failures reported last week were, in the United States, 136 against 183 the previous week, 140 in the like week of 1885, 201 in 1884, 264 in 1883, and 141 in 1882. The total in the United States this year to date is 7,243, against 8,333 last year, a decline of 990. In a like portion of 1884 the total was 7,873, in 1883 it was 7,202, and in 1881, 5,116.

The iron industry continues to develop into greater activity, and in some quarters prices show a tendency to advance. Eastern pig iron is firm with orders so abundant that furnaces are not taking all the offerings. Advances from Cincinnati are to the effect that prices have advanced 50 cents to \$1.00 per ton, with plenty of orders and an increasing demand. At Chicago buying is also active, and prices firm with an inclination to advance. Notwithstanding the very heavy output of iron in all directions, there is a feeling that the new impetus in the market will take it all so readily as to have a stiffening effect upon prices. The demand for manufactured iron too is quite active and prices firm, and slightly higher at some points. Steel rails are firm

at \$34.50 at the mills, with this year's production all taken and orders for '87 delivery being booked.

The Anthracite coal trade also continues to show a marked improvement. The production is limited somewhat by reason of a lack of transporting facilities, and the late advances in prices are fully maintained. Another advance may be made next week, and the outlook is that it will be fully realized. The October allotment of 3,250,000 tons, against 3,560,000 in October of last year, is regarded as a triumph of conservatism, although it is not impossible that this limit may be exceeded, as the present demand seems to warrant it. Consumers are beginning to realize the situation and are sending in their orders in a way that takes up the production as rapidly as it can be laid down at tide water. In point of production October is generally the heaviest month of the year. In 1885 the output was the largest in that month in the history of the trade, being 3,562,272 tons, and in 1884 3,063,434 tons. The Bituminous trade is also unusually active, but prices have not advanced greatly, and a strike in the Pittsburg district is talked over as a result of a disagreement between the operators and miners concerning the winter rates for digging. The belief is, however, that the difficulty will be amicably adjusted and that the trade will experience a season of brisk activity the coming winter.

THE READING SETTLEMENT.

The New York *Engineering and Mining Journal*, speaking of the settlement of the Philadelphia and Reading railroad troubles, says this: "The danger that for the past year has impended over the coal trade of the country, in the threatened disruption of the Reading company and its absorption of control by the Pennsylvania railroad, has fortunately been averted. The Drexel syndicate months ago found it could not secure the support of the security-holders of the company for its scheme of reorganization, and it has at last made the concessions required by Mr. Gowen. [Then follows the correspondence bearing on the settlement, when the *Journal* continues:] "The stock and junior security-holders owe a debt of gratitude to Mr. Gowen, who has so ably, so persistently, and so successfully defended their interests. His unselfish devotion has been again shown in his recent actions, when, his work accomplished, he retired from the presidency of the company. We trust his experience, ability, and unquestionable integrity will still be potent in its counsels, and the arrangement he has secured will result in that success to his stockholders that throughout his official career has been the aim of his ceaseless and disinterested efforts. The presence of so able and successful an officer as is Mr. Corbin in the receivership and as president of the company is a guarantee of success, and so indeed "the street" has interpreted it."

There is a general coincidence with the views of the *Journal* among those conversant with the inside history of the Reading struggle, and who have been able to view Mr. Gowen's position without the prejudice of financial interest or personal pique. He has won a good fight and won it well, and the coming years will more than justify the determined standpoint he took in the past few months. He has placed the security-holders upon a reasonable basis of safety, and removed a threatening danger from the coal interests. It is fair to expect that the Reading, "the finest [and most valuable] coal property in the country will enter upon a fresh lease of prosperity."

WHAT ability, pluck and enterprise can do in business undertaking is signally outlined in the career of John H. Inman, which we epitomize elsewhere. Mr. Inman is one of the money kings of the south, but his wealth has been legitimately acquired, is wisely and beneficially used in the interest of the general public and especially in the development of industrial life in the south, and in the private enjoyment of its blessings he is entitled to the best wishes of all. His career is a lesson to the ambitious youth of the land, in teaching them that while there is no royal road to wealth and fame in this country there is an opportunity for all who have the will to carve the way to power and distinction.

RESTRICTION of the output of coal is viewed radically different in this country and Scotland. Here operators and miners agree in the wisdom of the step, and neither attempts to coerce the other into working against his will, when mere restriction is

the object aimed at. The Scottish miners having lately resolved to attempt the restrictive game with a view to the future increase, or at least the maintenance of their present wages, the operators of all the collieries in the counties of Fife and Clockmannan posted notices that the miners who have resolved to restrict the output will be held liable for loss and damage which may be sustained by the employers. Meanwhile all work was stopped at the collieries in accordance with the new policy. The legal outcome of this grapple of master and man will be a matter of importance and interest to note.

THERE are four co-operative glass factories—one at Elmer, N. J., one at Wilmington, Del., and two in Ohio, at Findlay and Bellaire. They border on the joint stock idea. Isaac Cline, the veteran trades-unionist and President of the window glass association, has formulated a plan for future co-operative enterprises based upon dividing profits according to wages earned. Each co-operator will take as much stock as his wages are likely to amount to in one year and pay for the stock each pay-day by leaving a percentage back. The plan presupposes financial assistance on a large scale. Capital is to have as much as labor; that is, if a laborer has a dividend of \$50 on \$1000 worth of stock the capitalist is allowed the same on each thousand. Labor would make itself safe by fixing wages when profits would fairly allow. The scheme is to be published in pamphlet form.

THE effort of the Pennsylvania railroad company to obtain a controlling interest in the Clearfield bituminous coal company, the mines of which are located along the line of the Beech Creek coal company, has been blocked by the purchase of the same by Cornelius Vanderbilt, Joseph M. Gazzam and Martin E. Olmstead. These gentlemen announce that the company will be reorganized, the capital stock reduced and the directors reduced from thirteen to seven. The Pennsylvania's object was to get this company's product out of competition with the Clearfield coals along its own lines.

THE Consolidated coal company of St. Louis has filed the following warranty deeds of coal mines recently purchased in Southern Illinois: Joseph Yoch's mines, on the Cairo Short Line and Pittsburgh railroad, \$229,000; the Abbey coal mine, \$100,000; White coal company's mines, \$35,000; Joseph Richert's mines, \$10,000; Green Mountain coal company, \$6000; Dutch Hollow coal and mining company, \$59,000; John M. Shumann mines, \$48,000; Joseph Ogle's mines, \$19,000; Pittsburg, \$15,000; Concordia, \$7000; Poynton, \$54,000; Renicke, \$52,000.

At Walker, Kansas, where the rich coal discovery was lately made, a prospecting company has been organized for the purpose of sinking holes on the quarter section of land adjacent to the one upon which the coal was found, and if more coal is found a stock company will be formed for the purpose of sinking a shaft, and mining the coal. The coal was found at a depth of 219 feet and the vein was penetrated only 29 inches, and its thickness is as yet unknown. The coal is said to be fully as good as that mined at Rock Springs, Wyoming territory.

THE steamship Bulgarian, of the Leyland line, which arrived at Boston last week, on the passage over gave the test of practical operation to a mechanical process for the generation of steam at a much reduced consumption of fuel, and the attainment of the regular rate of speed per hour with the use of but about half the usual number of cylinders. The results during the trip out are considered very satisfactory. The steamer made use of but two out of her complement of four cylinders, and was able to economize largely in fuel.

FOLLOWING close upon the Englishmine horrors there came on Saturday a dispatch from Essen, Germany, announcing that an explosion of fire-damp had occurred in a coalpit near Schalke, and that forty-five persons were killed and sixteen injured. The scenes of agony and grief about the pit and in the homes of the bereaved ones were most heartrending, as detailed by the daily press, and call loudly for such reform in foreign mining precautions as will render less frequent, if not impossible, these all too frequent holocausts of martyrdom on the altar of coal.

THE mines of the Northern Pacific coal company at Timberline, M. T., have been closed, owing to the

continued trouble between the owners and their men. This action is regarded as a victory for the men, as it is practically an admission on the part of the coal company that they cannot secure men enough to carry on the work.

As is generally known, compound telegraph wires consist of copper deposited upon iron and steel. A wire, however, is now being brought out in England in which the relation of the two metals is reversed, the steel surrounding the copper. The wire is said to be drawn from compound metal consisting of a hollow ingot of steel filled with copper.

THE coal agents of the Pennsylvania railroad coal company have advanced the selling prices of coal on an average about 15 cents per ton. The demand for the company's coal is extremely heavy and exceeds the transportation facilities.

EVERY available piece of rolling stock is being pressed into the service of the coal carriers, and still they do not get the coal to tide-water that awaits shipment.

Bad P. & R. Reports.

The August P. & R. statement shows a decrease in net earnings as compared with August, 1885, of \$369,000. It is the company's worst monthly statement for this year.

The traffic returns show that last month the railroad carried 175,000 tons of merchandise more than in August last year, 387,000 more passengers and about 86,000 tons less of coal. Notwithstanding this increase in merchandise, tonnage and passengers, the gross receipts of the railroad were \$132,500 less than in August, 1885.

The statement of the coal and iron company is even more deplorable. The receipts were \$84,000 greater, but the expense account was \$287,000 greater. As a consequence the company fell behind in meeting its expenses \$181,000, against a profit of \$22,000 in August, '85, and a profit of \$211,000 in August, '84.

For nine months of the present fiscal year the loss of the coal and iron company foots up over \$1,600,000. The whole trouble is with the coal company, for the railroad's gross earnings have increased \$591,000 in the nine months of this year.

MINING NEWS.

A copper mine has been discovered in the Villadama district, State of Coahuila, Mexico.

It is stated that the Acid Iron Earth company, Mobile, Alabama, will double the output of their mines.

Messrs. Willie & Sanford will erect a smelting furnace at the Cash Tin mine in Rockbridge county, Va., to test the ore. It will cost \$9000.

A correspondent of the *Valley Virginian* writes: "Manganese! Manganese!! Manganese!!! is all the cry in our district. And it has been struck all along the line. At Kennedy a vein has been found whose depth has not been ascertained. Ten feet of solid ore has been drilled through at several points, and yet the bottom has not been reached.

The Keystone manganese and iron company, of which James McMillan is president, and Cyrus Elder treasurer, is placing its stock on the market. It will work a tract of manganese ore land in Arkansas. The greater part of the product is to supply the furnaces of the Cambria iron company, at Johnston, Pa., but the rest will be put on the market.

Capitalists are buying up all the mineral land in southwest Virginia. Northern capitalists purchased a large tract near Lynchburg paying \$34,000 cash. Several narrow gauge roads will be built to connect with the Norfolk and Western road at Pulaski station. Iron ore assayed runs 55 per cent. pure iron.

MININGS AND RAILINGS.

Dunkelberger & Co. are mining coal of excellent quality at the Allen colliery.

It is probable that two of the old Tuscarora collieries will soon be reopened.

Austin Corbin, the president of the P. & R. R. Co., is said to be worth \$25,000,000.

Franklin B. Gowen is still connected with the Reading companies as general solicitor.

The Lehigh Valley road proposes constructing a branch road from East Penn Junction to Fountain house, Allentown, to accommodate the silk mill in that portion of the city.

The committee appointed to draft an amendment embracing the modifications to be made to the plan for the reorganization of the Reading company will not be able to report to the reconstruction trustees for several days.

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F. M. Co. Box 115, Newport, Ky.

Harrison Berry, East Palermo, Maine, has a saw-mill which turns out 50,000 feet of long lumber yearly.

A NEW CONNECTION.

Reading About to Build an Independent Line into the Scranton Region.

For many a year a contract has been in operation between the Delaware and Hudson canal company and the Lehigh coal and navigation company governing the movement of freight and passengers into Scranton. The fifteen miles of track from Scranton to Green Ridge, where the Lehigh and Susquehanna railroad ends, was formerly owned by the Union railroad company. This corporation was merged in the Delaware and Hudson canal company, which, of course, assumed its contracts. The one with the Lehigh and Susquehanna road expires on November 6.

After several months of negotiation a new arrangement has been effected with the Delaware and Hudson, which will prove very profitable to the Lehigh and Susquehanna, and will be of great incidental advantage to the Reading. The Lehigh and Susquehanna, now operated by the Reading, uses the same depots for passengers and freight, and enjoys the same terminal facilities as the Delaware and Hudson. The Lehigh Navigation people wished to have a depot for itself, and, what was of more importance, desired to form a connection with the Delaware, Lackawanna and Western in Scranton. There would have been no trouble about a separate depot, but when connection with the Lackawanna was mentioned the Delaware and Hudson people became suspicious, and a long period of negotiation followed.

At this time the Lehigh Navigation was buying property in Scranton from the limits of the town to the main street, where it is proposed to build a depot. The site is regarded as an excellent one, being in the business part of the city and on level ground, whereas the old depot is below a bluff on which the town is built. Finally two propositions were submitted to the Delaware and Hudson. One was that the Lehigh and Susquehanna use the old tracks to within two miles of Scranton and then build to its new depot and a connection with the Lackawanna, and the other was that the Lehigh and Susquehanna build a new line from Green Ridge to Scranton and sever its relations with the Delaware and Hudson. Of course the former proposition was preferred, and the details are now being arranged.

The advantage to the Lehigh Navigation and Reading consists in the connection with the Lackawanna. There is great demand in interior New York for hard Lehigh white ash coal. Both the Reading and Lehigh Navigation mine this sort of coal, but the Lackawanna does not. Scranton coal, with which city markets have heretofore been supplied, is free burning, and makes considerable ash. Lehigh coal is hard, and has comparatively little ash. It is possible that some Scranton coal will be displaced for a time, but the introduction of the Lehigh product is expected to increase the Anthracite consumption, so that in a short time whatever loss may be suffered will be recovered. It is thought the Reading coal and iron company will be able to make large sales there. Independently of any advantage from the coal trade the connection will afford a short line for the Reading from Philadelphia to Binghamton and other southern New York points.

The Wire Age.

We have had the stone age, the bronze age, the iron age, and it is likely the future annalist will describe this period of American history as the wire age. In no part of the economy of daily life are we separated from wire. Sleeping, we repose on wire mattresses. Eating, we see foods that have passed through sieves, and which are sheltered from the flies by wire covers. Calling, we pull wires to ring curled-wire gongs. Traveling, we are conveyed by cable or electric railways, hoisted by elevators, hung on wires and hurried over wire bridges. We announce our coming by telegraph or telephone wires and we thread our way by night through streets lighted by means of electric wires. Across the prairies of the west are stretched thousands of miles of barbed-wire fences, against which dumb brutes protest, cowboys swear and draw the knife, and lawyers, juries, judges and reporters whet their intellectual blades. Our clocks are set by wires, our watches run by wires, our books are stitched with wires, our pictures hung on wires, and our politics managed by wire-pullers.

IMPORTANT.

When you visit or leave New York City save baggage, Expressage and \$3 Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot.

613 Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best. Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city.

23-ly

How much does a man, striking for an advance of 25 cents a day, make by loafing three months?

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Still on Correction.

Editor Mining Herald and Colliery Engineer.

SIR:—In an issue of Aug. 28th, 1886, "Learner" claims to have discovered an error in "Mr. Mauchline's" second question, or rather the answer to it. He asks us to know if he is right or not, and in your issue of Sept. 11th your correspondent "Trapper," seems to think that he has settled the matter by giving us his answer to the question. Now let me say that neither "Learner's" or "Trapper's" answer is correct. Now the error contained in "Mr. Mauchline's" question is something that all of us are able to make, and is only an error in his figures.

The formula he gives is all right. I embrace the same rule, and find the following figures. I take the square airway first.

$\sqrt{64 \times 4 \times 3,000} = 96,000$ square feet of rubbing surface.

Circular airway $\sqrt{\frac{64}{7854}} \times 3.1416 \times 3,000 = 85077$.

6696 square feet of rubbing surface. Now if we take the difference of their rubbing surfaces which will be the answer to the question. Thus:

96,000 — 85077 = 10922.3304 difference. Ans.

Now, sir, if "Trapper" can alter these figures and give us an answer with a closer approximation to the question, we will all be benefited by the correctness of his answer.

Yours, &c.,

ALEXANDER MCCAUGH.

United, Westmoreland Co., Pa., Sept. 16, 1886.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any of your able correspondents answer the following questions:

What is the pressure and power of ventilation at a velocity of 14 feet per second in an airway 4 feet by 4 feet 5 inches.

Yours, &c.,

G. H. B. R.

Houtzdale, Pa., Sept. 21, 1886.

Objects to a Title.

Editor Mining Herald and Colliery Engineer:

SIR:—In one of your late issue I noticed some remarks regarding M. Howard, mining engineer of the Coosa coal and coke company. I would like to ask the writer if he is acquainted with Mr. Howard and if he really knows the meaning of the term "mining engineer." Mr. Howard is not a mining engineer, nor does he hold that responsible position with the Coosa coal and coke company; he simply holds the position of mining boss at Ragland. We seldom if ever find an engineer who does not know something of mathematics, and Mr. Howard knows nothing of the sciences connected with engineering. Then why term himself, or allow himself to be termed that which he is not. Your paper is not the only paper that has been puffing "Engineer" Howard ignorant of the truth.

Mr. Howard is egotistical, ambitious and fond of seeing his name in print, reporting him as an inventor when he is simply doing what hundreds have done before him, viz.: using steam as a heater for ventilation; but all the hundreds that have so used steam eventually abandoned it for the better and stronger heater—coal, and this steam heat will one day prove itself entirely inadequate in Ragland. And what does Mr. Howard do? He exhausts the hoisting engine at the base of the air shaft stack, and because he does not take out a patent on this the writer of the article in your late issue thinks him philanthropic, or at least he writes to convey that idea.

Yours,

W. D. L. H.

Broken Arrow, St. Clair Co., Ala., Sept. 21, 1886.

Power and Regulators.

Editor Mining Herald and Colliery Engineer:

SIR:—Would any of your readers oblige "Maxim" with an answer to the following questions:

1. If 350-horse power is expended on a ventilating current of 35,000 cubic feet per minute, with water gauge at 0.69, what increase of power will be

required to secure the same quantity in 50 seconds?

2. Supposing a person taking charge of a colliery finds the plan on which it has been ventilated does not meet his views, and he determines to alter it (1) on measuring the air current he finds 145,000 cubic feet of air is passing into the workings per minute; (2) he decides to have seven divisions which branch off from the main incline right and left; (3) the first is to the right, and is 150 yards from the pit bottom, the second is to the left, and is 170 yards from the pit bottom, and the third is to the right and is 300 yards from the pit bottom, the fourth is to the left and is 340 yards from the pit bottom, the fifth is to the right, and is 500 yards, and the sixth is to the left, and is 540 yards, and the seventh is to the right, and 700 yards long. Now, the air courses (both intake and return) all being of equal sectional area, 40 ft., what is the size of the regulators required at each revision in order that the 145,000 feet per minute may be equally divided?

Yours, &c.,

MAXIM.

Carbondale, Pa., Sept. 22, 1886.

A Quartette of Inquiries.

Editor Mining Herald and Colliery Engineer:

SIR:—I would feel much obliged if "J. R." or any other of your able correspondents will answer the following questions:

1. What diameter of pumps will an 85 in. cylinder engine work from a depth of 120 fathoms, at a steam pressure of 15 lbs. to square inch?

2. How many imperial gallons per minute of feed water would be required to supply four boilers, 220 nominal horse power?

3. What size of hauling engine would be required to draw 100 tons per hour up an incline 1,200 yards long, having a gradient of one in five? Give rules for finding the same.

4. Where can I get a table of logarithms, sines, cosines, tangents, &c., and state price.

Yours, &c.,

J. H. D.

Birmingham, Ala., Sept. 18, 1886.

Miscellaneous Questions and Answers.

Editor Mining Herald and Colliery Engineer:

Question 1.—What is meant in mining by the term "steining?"

Answer.—The stone or brick lining of a shaft to



Fig. 1.

prevent loose strata of the sides from falling in, as shown in fig. 1.

Ques. 2.—What is meant by "stoop and room?"

Ans.—A term used in the mines in Scotland to designate a system of mining, the plan of which is

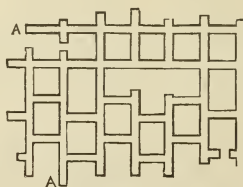


Fig. 2.

shown in fig. 2. Large square pillars are first opened by narrow places, and the pillars worked off backwards in the final mining.

Ques. 3.—What is meant by a "tip?"

Ans.—A contrivance for emptying cars, being a



Fig. 3.

platform forming part of the track balanced on an axle and operated by a lever as shown in fig. 3.

Ques. 4.—What is a "trough fault?"

Ans.—A wedge shaped fault, or more correctly, a mass of rock, coal, &c. set in between two faults as

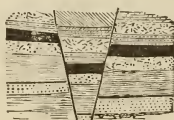


Fig. 4.

represented in fig. 14, which faults, however, are not necessarily of equal throw.

Ques. 5.—What is an "under-cast?"

Ans.—An airway carried under a main road by a bridge made air tight or a heading in the solid.



Fig. 4.

This cannot often be done on account of water accumulating and blocking the air. See fig. 5.

Shenandoah, Sept. 27, 1886.

Gold in Germany.

The following figures give the gold production of Germany for a number of years:

	lbs.		100 lbs.
1849.....	5 72	1863.....	101 20
1850.....	8 36	1864.....	92 62
1851.....	20 68	1865.....	77 88
1852.....	292	1866.....	231 22
1853.....	42 90	1867.....	186 56
1854.....	28 38	1868.....	252 22
1855.....	34 54	1869.....	173 80
1856.....	19 14	1870.....	129 84
1857.....	22 34	1871.....	181 06
1858.....	33 44	1872.....	230 50
1859.....	45 10	1873.....	629 00
1860.....	54 68	1874.....	383 22
1861.....	62 70	1875.....	731 06
1862.....	21 56	1876.....	518 86

The gold occurs in lead and copper ores in very minute quantities. The gold produced in Prussia, which is a very small quantity, is obtained by an interesting process. The peroxide of iron, obtained in roasting the arsenical gravel, is impregnated with chlorine gas, washed with water, and the gold contained precipitated with sulphuretted hydrogen. The resulting sulphide of gold is roasted, washed with hydrochloric acid, and smelted with borax and nitre.

HAYES' SQUIBS.

Their Merits Call for Another Factory to Supply the Demand.

The one great desideratum in the perilous life of a miner is a safe and reliable fuse or squib for the setting off of his blasts. Of all the mine casualties of the coal region, the greatest percentage and usually the most fatal are those which flow from premature blasts, or the "hanging fire" of a squib in a charged hole. Various patents have been taken out for the manufacture of a squib that could be depended on at all times to do its work with safety to the collier, but only in rare instances have they stood the test. Changes of weather, atmospheric influences, mine dampness or dryness, with various other causes have acted on them to their detriment and the users have suffered. One exception to the rule has been the "Hayes squib," manufactured by George Hayes, at Girardville. It is the outcome of a practical miner's careful study and most exacting experiments, resulting in the production of an article that comes as near perfection as it is possible to do. It has been received with so much favor that for months past the manufacturer's resources have been overtaxed to supply the demand. Mr. Hayes gives his own personal supervision to the making of the squibs, and to this fact is due the measure of reliability they have gained. So long as he is able to do this he fears no failure in their service. In his Girardville factory a large number of workers are employed, yet they cannot keep up with the market calls. To remedy this Mr. Hayes is about to open a branch factory at St. Clair, fitting it out in every respect co-equal with his present place, and guaranteeing the same excellence in its products. The success he has gained in his business has been well earned by Mr. Hayes and the HERALD congratulates him on its enjoyment.

The recent inquiries into the dangers of blasting have served to stimulate invention in the direction of mechanical "coal-getters." Several promising devices have lately been brought to the notice of colliery owners in England and on the continent. Some of these are now undergoing the test of actual work. In the Westphalian mines particularly, attention is given such machines, two or three of which have already won their way into favor. Foremost amongst these is that of Herr von Walcher. This apparatus, says Mr. George G. Andre, in the Colliery Guardian, is in regular use in three important collieries, from each of which have been received a highly satisfactory report of its working.

One day recently at Columbus, Kansas, a deed was placed on record, having for its consideration the sum of \$500,000. The conveyance is for a large body of coal lands gathered up last winter, and now the hands of a syndicate known as the Western coal company, whose headquarters are at Cherokee. This land in question lies in the immediate vicinity of Cherokee and is tapped by the Nevada and Minden railroad. This coal land before the transfer belonged to Jay Gould and consisted of a tract of 5000 acres and sold for \$100 per acre. In Cherokee county the same party sold 5144 acres to the same syndicate at the same price per acre. The price Gould paid for these lands a few months ago was \$35.00 per acre.

IN COAL.

GENERAL ITEMS PERTAINING TO THE MINING OF THE MINERAL.

It is claimed that the city of Hamilton pays more for coal than any other city in Ohio.

A number of capitalists, principally from Boston, have combined to work the bituminous coal veins of Clinton county in the vicinity of Cato, Pa.

The supervisors of Harrison county, Iowa, are about to offer a reward of \$5000 for the discovery of coal in paying quantities within the limits of that county.

There are no less than 60 mining companies already organized to operate on the Gogebic iron range, but not more than half of these have as yet produced ore.

The Knights of Labor in Chester, Pa., are to stock and operate a coal yard. They promise to give 2240 pounds to the ton for the same price as others charge for 2000 pounds.

The Connellsville coke and iron company has lately been boring on its tract of 9000 acres of coal land with a view to locating the shaft for a third coke works. The works will consist of 500 ovens.

The miners of soft coal in the Clearfield district demand an increase of 10 percent. to take effect October 1. The operators state that the present condition of the market will not warrant an increase.

At Packer No. 5 shaft, Rappahannock, Schuylkill county, Pa., a few weeks ago the Mammoth seam of coal was cut at its greatest thickness, and now comes the report that the Buck Mountain has been reached in the tunnel and is supposed to be thirty feet in thickness.

The Houtzdale, Pa., *Mining Record* says that the rope for the endless rope system to be put in at Atlantic mine has arrived, weighing over 17 tons. The main wheel, or sheave, accompanying the rope was reshipped to Vulcan iron works, Wilkes-Barre, Pa., to have the shaft placed in it, &c.

The Hocking Valley coal exhibited at the Ohio state fair by the Ohio coal exchange was awarded the first premium. One block of their exhibit weighed 5000 pounds. It was taken out of the Consolidated coal mining company's mine and Sand Run, which is working in the Nelsonville seam.

The Hawkeye coal and mining company, of Ottumwa, Iowa, has been incorporated with \$20,000 capital stock. The officers are Hon. James Dooley, of What Cheer, president; S. Kirkpatrick, vice-president; E. Kessler, secretary, and D. A. Pool, treasurer. They have about 300 acres of land leased, fronting on about a mile of the C. M. & St. P. R. R.

UP THEY GO.

AFTER REDUCING THE OUTPUT THE COMBINATION RAISES PRICES.

PHILADELPHIA, Sept. 24.—The executive committee of the Lehigh and Schuylkill coal exchange met today and agreed to advance the line, city and harbor prices fifteen cents on all sizes except lump, steamboat and pea on October 1. The rates for hard and free burning white ash coal at Schuylkill Haven will be \$2.60 for lump and steamboat, \$2.75 for broken and egg, \$3 for stove and small stove, \$2.75 for chestnut and \$1.25 for pea. These prices are fifteen cents per ton higher than those ruling in October last year, but are about the same as the prices in October, 1884, and fifteen cents lower than those in October, 1883. The demand is reported as very good, and coal agents say they will adhere firmly to the advanced prices. The Pennsylvania railroad company will also increase the prices of Anthracite, and may put some prices higher than the Lehigh and Schuylkill companies. The Reading company's supply at Port Richmond is almost exhausted, and it is said that the entire stock on hand is sold. The company has only about six thousand tons each of stove, chestnut and special grades of egg and none of the other sizes.

Reports from New Orleans state that the orange crop in Louisiana is a complete failure; that there will be none of the fruit for shipment and barely enough for home consumption.

SCIENTIFIC.

THE USE OF ELECTRICITY FOR VENTILATION AND PUMPING.

Electricity has for some time been employed by the Trafalgar colliery company, Cal., for underground ventilating and pumping with so much success that it was resolved to extend the use of this agent also to its underground railroads. In Germany there are several collieries so worked, but in these cases the current was sent to the locomotive by fixed conductors. In the Trafalgar colliery the electric locomotive carries its own stores of current with it in a series of accumulators, the weight of which represents so much useful adhesive weight on the rails. Where the underground lines have sharp curves, haulage of trains by wire ropes presents great difficulties, and horses are generally employed. This locomotive has been designed by A. Reckenzaun, and has been in use for several weeks. The construction of the motor and driving gear is similar to that adopted in electric street cars, but the conditions to be satisfied were widely different and more difficult than those obtaining in an ordinary tramway. The space is very limited, and since both sharp curves and heavy gradients occur at frequent intervals, it was somewhat difficult to stow away the necessary power in so limited a space. Within the narrow gauge of two feet seven inches, and an extremely short wheel base, there had to be arranged an electro-motor of 8 horse power, with suitable gearing brakes and attendant details.

A LAYER OF COAL.

According to the calculations made by a scientific writer, lately, it requires a prodigious amount of vegetable matter to form a layer of coal, the estimate being that it would really take a million years to form a coal bed 100 feet thick. The United States has an area of between 300,000 and 400,000 square miles of coal fields, 1000,000,000 tons of coal being mined from these fields in one year, or enough to run a ring around the earth at the equator 5½ feet thick, the quantity being sufficient to supply the whole world for a period of 1500 to 200 years.

BALLISTIC PHOTOGRAPHY.

It is said that Krupp, of Essen, is making preparations to make extensive use of the photograph in the solution of some important ballistic operations. He is to employ an expert who will devote his attention chiefly to take photographs of projectiles in transit, the recoil of gun carriages, the penetration of armor plates by projectiles and similar phases in artillery practice, all in the interest of the German admiralty. As projectiles have an average velocity of 1500 feet per second, the obstacle to be overcome in obtaining satisfactory photographs is very great.

Reading's Earnings.

PHILADELPHIA, Sept. 27.—The statement of business of the Philadelphia and Reading railroad and coal and iron companies for August, 1886 shows a decrease in gross earnings of \$48,949; increase in expenses of \$20,431; decrease in net earnings, \$369,380; statement for nine months ending August 31, 1886, as compared with same period in 1885, shows an increase in gross earnings of \$10,508,471; increase in expenses, \$1,880,135; decrease net earnings, \$821,667.

Ex-Prest Goven for Congress.

PHILADELPHIA, Sept. 27.—It is stated on good authority here to-night that Franklin B. Gowen, late president of the Philadelphia and Reading railroad company, has decided to become a candidate for congress on the Democratic ticket in the Schuylkill district. This decision, it is stated, was only reached after repeated requests had been made of him by friends and representatives of the party in Schuylkill county who desire to encompass the defeat of Congressman Brumm, who has represented the 13th district in congress during the past six years.

A metal that expands in cooling is made of lead nine parts, antimony two parts, bismuth one part. This alloy can be advantageously used to fill small holes and defects in iron castings.

No Room for Old Mother.

"Going north, ma'am?"
"No, ma'am."
"Going south, then?"
"I don't know, ma'am."
"Why, there are only two ways to go."
"I didn't know. I was never on the cars. I'm waiting for the train to go to John."
"John? There is no town called John. Where is it?"
"Oh! John's my son. He's out it Kansas on a claim."
"I am going right to Kansas myself. You intend to visit?"
"No, ma'am."
She said it with a sigh so heart-burdened the stranger was touched.
"John sick?"
"No."
The evasive tone, the look of pain in the furrowed face, were noticed by the stylish lady as the gray head bowed upon the toll-marked hand. She wanted to hear her story; to help her.
"Excuse me—John in trouble?"
"No, no—I'm in trouble. Trouble my old heart never thought to see."
"The train does not come for some time. Here, rest your head upon my cloak."
"You are kind. If my own were so I shouldn't be in trouble to-night."
"What is your trouble. Maybe I can help you."
"It's hard to tell it to strangers, but my old heart is to full to keep it back. When I was left a widow with the three children, I thought it was more than I could bear; but it wasn't bad as this—"
The stranger waited till she recovered her voice to go on.
"I had only the cottage and my willing hands. I tolled early and late all the years till John could help me. Then we kept the girls at school, John and me. They were married not long ago. Married rich as the world goes. John sold the cottage, sent me to the city to live with them and he went West to begin for himself. He said he had provided for the girls and they would provide for me now."
Her voice choked with emotion. The stranger waited in silence.
"I went to them in the city. I went to Mary's first. She lived in a great house with servants to wait on her; a house many times larger than the little cottage—but I soon found there wasn't room enough for me—"
The tears stood in the lines on her cheeks. The ticket agent came out softly, stirred the fire, and went back. After a pause she continued:
"I went to Martha's—went with a pain in my heart I never felt before. I was willing to do anything so as not to be a burden. But that wasn't it. I found they were ashamed of my bent old body and my withered face—ashamed of my rough, wrinkled hands—made so tolling for them—"
The tears came thick and fast now. The stranger's hand rested carelessly on the gray head.
"At last they told me I must live at a boarding-house, and they'd keep me there. I couldn't say anything back. My heart was to full of pain. I wrote to John what they were going to do. He wrote right back, a long, kind letter for me to come right to him. I always had a home while he had a roof, he said. To come right there and do as long as I lived. The old mother and she'd never go out to strangers. So I'm going to John. He's got only his rough hands and his great warm heart—but there's room for his old mother—God bless—him—"

The stranger brushed a tear from her fair cheek and awaited the conclusion.
"Some day when I am gone where I'll never trouble them again, Mary and Martha will think of it all. Some day when my hands that tolled for them are folded and still; when the eyes that watched over them through many a weary night are closed forever; when the little old body, bent with the burdens it bore for them, is put away where it can never shame them—"

The agent drew his hand quickly before his eyes, and went out, as if to look for the train. The stranger's jeweled fingers stroked the gray locks, and the tears of sympathy fell together. The weary heart was unburdened. Soothed by a touch of sympathy the troubled soul yielded to the longing for rest, and she fell asleep. The agent went noiselessly about his duties that he might not wake her. As the fair stranger watched she saw a smile on the careworn face. The lips moved. She bent down to hear.

"I'm doing it for Mary and Martha. They'll take care of me sometime."
She was dreaming of the days in the little cottage—of the fond hopes which inspired her, long before she learned, with a broken heart, that some day she would turn, homeless in the world, to go to John. —(Chicago Current.

RANDOM NOTES.

MATTERS OF BUSINESS AND LABOR OF A GENERAL CHARACTER.

The Japanese have recently imported \$5000 worth of American clock machinery.

Unless natural gas is found at or near Monongahela City, the glass works will be moved from there. So says an exchange.

A new mineral just found in Missouri cuts steel, yet keeps its edge. It has been given an outlandish name—adamascobite.

The Union steamship company, of Buffalo, N. Y., are about to replace their fleet with large steel steamships as soon as possible.

It is stated that a new southern railroad company has in contemplation the importation of blooms for the manufacture of rails for its entire line.

The B. F. Smith smelting and mining company has been organized at Hot Springs, Ark. The company will erect a 120-ton smelter in Montgomery county.

Specimens of steel rails from the South Carolina railroad, twisted into a reversed curve by earthquake power, have been forwarded by Prof. Earle Soane to the Smithsonian institute, Washington, D. C.

A locomotive boiler with too little heating surface may be made to steam better by increasing the size of the fire box. Instances are on record where locomotives have been greatly improved by having had the backs of the fire-boxes taken out and the fire boxes lengthened 12 inches.

The green glass factories at Binghamton and Lancaster, N. Y., Stroussburg, Pa., and Winslow, N. J., resumed operations lately. There are now twenty eastern district factories in operation, employing 350 blowers and 100 other hands, and in these the apprentice system has been abolished.

The oldest iron ore mine in the United States that is now in operation is the Iron Hill mine in Delaware, which was discovered as early as 1684, and soon afterwards opened. Ore is still taken from this mine and used in Principio furnace, in Maryland, the first stack for which furnace was built in 1723.

Rumors About the Reading.

This is great weather for wild rumors about the Philadelphia and Reading company's reorganization. "It is scarcely worth while to notice these rumors," said a gentleman who is thoroughly conversant with the syndicate's affairs, "but I will set them at rest if you care to publish my assertion. The syndicate has not bought a dollar's worth of the bonds or stock for the Pennsylvania railroad, themselves, or any other party of interest during the past few days or at any other time. It is not a part of the syndicate's purpose to speculate in the shares or bonds of the Reading company, and all of the stories lately set afloat have found their conception in the minds of people who have used them for their own ends."

Mine Inspectors' Convention.

In pursuance of the call of Secretary Africa a meeting of the inspectors of the anthracite and bituminous coal districts of this state was held at Harrisburg on the 23rd. All districts but one were represented. The meeting was held for the purpose of securing uniformity in the reports of inspectors to the bureau of statistics; and a regular form was adopted for use in all the districts. These reports are made by law to the secretary of internal affairs. Remarks and suggestions were made by several inspectors as well as by Secretary Africa, Joel B. McCamont, chief of the bureau of statistics, and others. The meeting was very satisfactory in its character and the result of its proceedings will be a simplification of reports.

Forty-five Miners Killed.

BERLIN, Sept. 24.—A dispatch from Essen announces that an explosion of fire damp occurred in a coal pit near Schalke, today, and that forty-five persons were killed and sixteen injured, eight of the latter being in a precarious condition.

GAS WELLS IN OHIO.

The Towns and Cities All Over the State Boring for Cheap Fuel—Opinion of an Eminent Geologist.

Prof. Edward Orton, the state geologist of Ohio, recently gave a *New York Mail and Express* reporter some interesting facts about inflammable gas, which has been discovered in the Buckeye state. Ex-Gov. Foster has a large share in gas wells and thinks it will be the cheap fuel of the future. The state is as much worked up over the large gas fields supposed to be in many different sections as it usually is about politics.

The professor said: "When natural gas was used on a large scale in Pittsburgh three years ago it created a profound impression upon competing manufacturing centres, especially upon the towns and cities of eastern Ohio. The new fuel was discovered to be much cheaper than any other, and the manufacturing towns that were fortunate enough to have it convenient to utilize, made competition almost impossible to those without it. This fact caused a search for natural gas to begin in eastern Ohio. The result has been that it was discovered in the western part of the state and other sections. High pressure gas was discovered in '84, in Findlay, Hancock county, at a depth of 1,100 feet. The surface signs of gas were very obvious and abundant there, but the source had not been discovered nor even conjectured. It was a complete geological surprise to find the Trenton limestone, one of the most widespread and important strata of lower Silurian age in North America, but which nowhere rises to the surface in Ohio, a source of gas, and later of oil. This well at Findlay is the pioneer one in that section, and from the first shot up a flame that indicated what a powerful source of light and heat had been discovered. Petroleum oil and natural gas have a common history. They are produced by the same agencies."

"Who discovered the Findlay gas wells?"

"Dr. Charles Oesterlin, a highly-respected citizen of Findlay. Inflammable gas has been constantly found in Findlay during the past fifty years in digging wells, cisterns, and sewers; in springs and rock crevices. It is a well-known fact that Jacob Carr had for a number of years lighted his house on Main street with gas collected from wells on his premises. Daniel Foster in 1838 introduced the gas into Mr. Carr's house and it has been running ever since. The fact that explosions frequently occurred in wells from natural gas made many afraid of it. But Dr. Oesterlin saw clearly that it could be made a source of light and heat. He desired to start a company many years ago and drill for gas. The Findlay gas company (artificial gas) saw that its occupation was gone unless it sunk a well and secured natural gas. It did so and turned on the natural gas into the city mains. Machine-shops and manufactories drilled wells and used the gas to run their machinery. The third well sunk yielded about eighty thousand cubic feet of gas per day. The first and second yielded nearly three times as much as the third. The fourth well panned out much better than the rest, and the anerometer measurement showed that 1,296,000 cubic feet were escaping each day. There are now seventeen wells or more in use in and around Findlay. Two of the seventeen wells were failures. The others were productive, eleven yielding dry gas and four yielding gas and oil. Of the last number one is an oil well exclusively, but there is gas enough in it to raise the oil once in twenty-four hours, the flow averaging thirty-five barrels per day. Of the eleven wells yielding gas alone one stands out very prominently. The Karg well is probably the largest in the state. It was opened in January last. The measured yield of this well is twelve million cubic feet per day. Four of the principal wells yield per day as follows:

	Cubic feet.
Karg well.....	12,080,000
Ortwell.....	3,315,000
Briggs.....	2,565,000
Jones.....	1,159,200

"The composition of this gas is as follows:

Marsh gas (light carburetted hydrogen).....	82.61
Methane gas.....	0.30
Hydrogen.....	1.18
Nitrogen.....	0.31
Oxygen.....	0.34
Carbonic acid.....	5.9
Sulphuretted hydrogen.....	0.21

"In 100 cubic feet there are 125.8 grains of sulphur. Its specific gravity is 57. Hence 1 cubic foot weighs 318.98 grains."

"How much does this gas cost?"

"Well, one thousand feet of natural gas will be equal to 8 cents in coal. The town of Findlay is run entirely by natural gas, from the teakettle and street-lamp to the mill, the glass-house, the machine-shop, and the factory. The gas company has established the following rates:

For cooking stoves, per month.....	\$ 1.00
For sitting-room, per month.....	1.50
For grates.....	2 00/2 50
For house light.....	15/20 30
For patent line kilns, per year.....	1.00
For boilers, from \$150 upward per year.	

"A proposition to bond the town for \$40,000 to lay pipes and drill wells, if necessary, to supply gas at

cost, has been carried by an overwhelming majority. A great deal of gas was wasted during the last year. It was owing to the peculiar condition of developments going forward. In the spring of '86 there was for months a daily waste of at least 16,000,000 cubic feet of gas.

"At the rate of value previously given, 8 cents to 1,000 cubic feet, this would aggregate a daily loss of \$1,280. The other towns of northern Ohio were quick to draw when 'Findlay' struck gas. Their expectations that being severally underlain by upper Silurian limestone as Findlay is their chances to obtain the new fuel were as good proved to be unfounded. The occurrence of gas and oil in Findlay is associated with an anomalous and most surprising departure from the regularity that in general characterizes the rocks of the state, and the whole question is a geological one after all. Bowling Green, the county seat of Wood county, twenty-four miles due north of Findlay, was the next to drill wells. It was fortunate that no gas was found within the corporate limits of the town—if so every citizen would have drilled a well upon his lot. The wells are one mile from town. The company that has piped the town has a monopoly, which, in such a case, tends to the general good. Gas is furnished at rates about one-third less than the cost of wood or coal to do the same work, not counting the saving of trouble and expense attending the use of the new fuel. Some of the charges are as follows:

House lights.....	30 to 36 cents per month
Cooking stoves.....	\$3 per month in winter
Heating stoves.....	\$3 per month in winter
Line burning.....	1 cent per bushel

"A successful well has been recently sunk at Bloomdale, seven miles from Fostina, where Gov. Foster resides. The Bloomdale has proven to be a great well; its daily yield does not vary much from 3,000,000 cubic feet. The gas will be piped to Fostina, which is a very ambitious and enterprising town. Gov. Foster has a big interest in the Bloomdale well, and has organized a company to pipe the gas some thirty or forty miles. It is always best to discover gas some little distance from a town. If it were found in town, accessible to all land-owners, the capital invested by a company would come to naught. There are fifty other towns in the western half of Ohio industriously boring for gas, inspired by the success of Findlay."

MINES IN MARYLAND.

A Glance at the Georges Creek Coal Field—Improvements, Prospects, Etc.

This pretty little mountain town, containing a population of about 6,000, sits high up on the mountain, 1,100 feet above Cumberland, sixteen miles distant. It contains many beautiful and comfortable little homes of miners and others employed in the neighborhood. Along its main street are large well stocked business houses. In its corporate limits are fourteen churches, some of them quite large, especially the Catholic, Methodist, Episcopal, German and English Lutheran, whose tall spires attract the eye of the stranger as he comes up the mountain on the Switchback railroad long before reaching the depot. Frostburg is also becoming quite a summer resort. A large number of city people spend the heated term here this year. As the collieries near the village have all been running steady since the close of the strike, business generally has been very good with merchants, the companies all making cash pays once a month.

The coal field known as the Big Vein or George's Creek lies between Frostburg and Piedmont, West Virginia, a distance of sixteen miles. Through it the Cumberland and Pennsylvania railroad company run their road, connecting with the Baltimore and Ohio road and the Chesapeake and Ohio Canal at Cumberland, and again with the Baltimore and Ohio at Piedmont, over which road all the companies ship their coal except the Maryland and American, who ship over the new George's Creek and Cumberland road running from Lonaconing to Cumberland. In this region there are 25 large collieries, shipping each week between sixty-five and seventy thousand gross tons of coal. The coal seam runs from 12 to 14 feet in thickness, but is not all taken out. It is divided into three parts—the top breast and bottom coal: the top coal being about two feet and the bottom two and a half feet. The mines at this end work this coal between the top and bottom 8½ to 9 feet. At Lonaconing it is worked from 7 to 7½ feet and at the lower end of the basin from 10 to 11 feet. The roof in the mines is very treacherous, and great care in posting is required of the miners, who receive 40 cents per gross ton, run of mine coal. Below we give some notes of the mines and improvements made about them.

The Consolidated coal company is composed of Chas. E. Mayer, president; C. W. Keim secretary and treasurer, with headquarters in Baltimore. P. L. Burwell is the resident agent and superintendent of the Cumberland and Pennsylvania railroad. This company are the largest miners and shippers of steam coal from the Georges Creek regions. Last year their total shipments were 710,000 gross tons. These mines are all located near Frostburg,

and are under the general supervision of B. S. Randolph, a well known practical engineer, who has made many changes in the system of working and improvements in mine drainage, etc. He now has 1,000 men under his control.

The largest mine in their group is the Huffman, located two miles from town on the Eckert railroad. Joseph Thomas has charge of this work, assisted by James Sloan. The coal is reached by a slope running down to the fifth lift 5,000 feet. The coal seam dips about 260 feet in the 5,000. It is worked in lifts 1,000 feet apart to the left of the slope. The first and second lifts are worked out. The coal from the third lift is brought forward a mile and a quarter with a locomotive. It is still another mile from where the locomotive takes the coal to the face of the main heading. The rooms are worked to the rise of coal, thirteen feet wide. Eight feet of coal is taken out, leaving eighteen inches or two feet on top. The fourth and fifth lifts are being worked, taking out 12,000 tons daily. About 250 men are employed. The mine is ventilated with a large fan. Fine hoisting machinery is set at the mouth of the slope.

The next largest mine is the Ocean, five miles from Frostburg, on the C. & P. road, in charge of Philip McMahon. This is also a slope opening 2,500 feet to the basin of the coal. This opening is into an extensive field of fine coal, and is destined to be one of the largest mines in the region. Mr. Randolph has done a fine piece of engineering here and is driving a tunnel heading on the left of the slope, which when complete, will give perfect drainage for the entire mine, enabling them to get into a very large tract of coal on the left of the slope. This tunnel is also being driven from the outside, and when complete will be 4,800 feet in length. The Eckhart slope is one mile from Frostburg. It is in charge of Daniel Kropf. The slope is down 2,000 feet to the basin of the coal. In the second lift, but will soon be operating in the third lift. About 170 men are employed, shipping 600 tons daily.

The New Hope mine is a short distance below Frostburg, in charge of Charles Leatham. It is also a slope opening 1,200 feet in depth. A large amount of coal has been hoisted from this opening. A rock tunnel is also being driven through this work for drainage purposes. When completed, with its connections, it will be four miles in length underground. It is expected to drain the Huffman, Eckert, Hope and Allegheny mines through this tunnel. About 150 men are employed in the Hope putting out 550 tons daily.

The Allegheny is a drift opening a short distance below the Hope under the supervision of W. A. Somerville, who employs 75 men. An incline plane 400 feet in length is run from the mouth of this mine to the triple at the foot of the hill. The men in all these mines have been having all the work they wanted to do the past three months, and the prospects appear favorable for a continuance for some time yet.

The Blaen Avon coal company, Andrew Speer, president, and J. B. Hart, secretary, have been operating a large mine for two years back, two miles from Frostburg, under the general supervision of Archie Stewart. The opening is a drift into a fine piece of the Big Vein coal. An incline plane, 850 feet in length, lands the coal at the bottom of the hill onto the tippie. Unfortunately for the company and for the community, the coal is about worked out, or will be during the year. About 100 men are now employed drawing back pillars, putting out 450 tons daily. One year more will probably clean the hill out.

Frostburg, Md., Sept 26.

German Regulations for Working Coal Mines.

Mr. George G. Andre, in the *Colliery Guardian*, says: Immediately after the issue of the final report of the German commission, the use of black powder in fiery mines was prohibited in the fiscal collieries with the view of ascertaining the practicability of enforcing such a step generally. The results have been satisfactory from several points of view. It has been shown to the conviction of the most skeptical that, in the greater number of cases, the extraction of coal may be carried on by mechanical means without much addition to the cost of production; and that where an explosive is needed, certain of the detonating compounds may be safely employed.

With these facts to act upon, the German mining authorities have now prohibited the use of black powder altogether. Henceforth, gun-cotton and blasting gelatine will be used for blasting down coal in some cases with, but often without the water shield. But mechanical apparatus will, probably, be everywhere used in all but the hard seams. Consequences of the discoveries made by the German commissioners are to be seen in the regulations for the conduct of blasting operations in many of the mines of the Prussian Branch. In three cases, I learned that plastic clay tamping was prescribed by the regulations, and this tamping was to consist solely of the prepared pellets supplied to the miners for that purpose by the manager. In another case, I found an order enforcing a recommendation to put a handful of wet moss over the charge before stemming the shot. I may remark on this, that experiments that I witnessed some time ago showed the wet moss to be capable of greatly diminishing, if it did not wholly extinguish, the flame of a blow-out shot. In another place, the men were using some gelatinous substance in place of the moss, the nature of which I could not learn.

TRADE REVIEW.

THE COAL TRADE.

The sensation of the week in coal circles was the announcement that Governor Pattison and Attorney-General Cassidy proposed crusading in law for the abolishment of the coal pool or combination. There have previously been unauthenticated reports that such a step was contemplated, but in this instance we have the authority of the governor himself for the contemplated action. As to the feasibility of such a procedure, there is and will be a wide difference of opinion, pro and con. It is safe to presume, however, that the move is one resulting from long and careful consideration, while the repute of Mr. Cassidy as a lawyer is such as to warrant the belief that there is a ground on which strong and interesting battle can be waged. To the layman, viewing the case from an ordinary business standpoint, there would seem to be no basis on which the combination could be disrupted or banned by law; as in all other mercantile, trade, or industrial enterprises, those engaged in the coal trade would be regarded as having the right to say just when and how they would operate their collieries, or dispose of their products. And so they would have, if it were simply a question of individual operation, apart from the relation the case bears to the railroads and their duties and amenities to the public by and through whom they acquire chartered life. There are intricacies of legal lore and technical discriminations which enter into the judicial aspect of the case, so far as the great carrying and mining corporations are concerned that are above the discernment of the common mind, but may have an all-potent influence in determining the issue. The HERALD is not prepared to pass an opinion as to the possible outcome of this move by the state officials, though it is free to say that it does not see the necessity therefor. It believes that the combination is less an injury than a benefit to even the general public, while it is manifestly necessary to the success of coal mining alike in its capitalistic and labor sense. For the vast amount of capital invested in the trade there must be a fair profit realized, or it will seek in other fields of enterprise a due measure of return, and the mineral that is the mainstay of eastern Pennsylvania will lie buried and useless; for coal mining has now passed the stage where petty individual operating can make any headway. Under the cutthroat policy that preceded the formation of the coal combination there was no profit in the trade—and ruin financially was the impending sword over the households of operator and employee. There was and is necessity for an understanding between all the involved interests that would end and prevent a recurrence of such a state of affairs. That understanding is what the state authorities now seek to dissolve, and without the warrant of a public complaint against it. How they will succeed remains to be seen.

We reprint elsewhere the views of the gentlemen most directly interested in the dispute. They are of divers notes, although all seem to agree in discounting the contemplated legal action as a failure in advance.

In the meantime, trade outlook is good, orders being plentiful and the most serious trouble being the lack of cars for transportation of the mineral to tide-water points. At New York the yards are reported to be still well stocked, but coal, for country delivery, is not available and orders are being temporarily refused. Prices went up on the first, the advance being about 15 cents, the same being so well maintained that some of the enthusiasts are talking of another advance. At the late meeting of the New York exchange stove coal would have been advanced to \$4.25 instead of \$4.15, but for President Hoyt, who had issued his price circular in advance of the meeting and had marked stove coal at \$4.15. He would not withdraw his circular and the other companies would not allow him to ask less than they did. The Reading felt able to charge \$4.25, and its new circular will quote this figure. At the next meeting of the managers on October 14 the other companies will probably come up to it. An advance in other sizes is likely to be made at the same time.

A good deal of coal is being shipped west by the Lehigh and Wilkes-Barre, Lackawanna and Lehigh Valley. The New England demand is fully up to what it has been in any previous year. Manufacturing sizes are in good request, and the domestic

sizes, except perhaps chestnut, are also active. The demand for egg is said to be extraordinary. At Port Richmond of some kind there is not enough to load vessels waiting for it. The supplies at New York are rather heavier.

The talk of strikes in the Lehigh and Schuylkill regions, especially the former, is mainly the fomentations of frothy labor agitators or mendacious reporters for city papers. The selling prices of coal will now almost if not fully warrant the payment of basis wages, and rather than lose the profits of this brisk season the operators will doubtless grant proper wage advances.

The total amount of Anthracite coal sent to market for the week ending Sept. 25, as reported by the several carrying companies, was 747,941 tons, compared with 756,767 tons in the corresponding week last year, a decrease of 8,825 tons. The total amount of Anthracite mined thus far in the year 1886 is 22,509,715 tons, compared with 21,610,532 tons for the same period last year, an increase of 889,182 tons. The following statements give the gross tonnage of each of the leading coal carrying companies for the week ending Sept. 25, and for the year to same date, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R. R.	312,284	10,227,846	9,721,527	1,506,319
Lehigh Valley	145,274	5,124,457	7,500,888	1,376,431
D. L. and Western	123,389	3,546,602	3,345,660	120,942
Shamokin	17,292	606,081	705,527	99,446
Und. R. R. N. J.	30,857	1,177,515	1,207,770	30,255
Penna. Coal	39,965	1,035,724	938,782	96,942
Del. and Hudson	81,774	2,919,310	2,641,006	278,304
Pa. and N. Y.	40,461	1,462,670	1,233,581	229,089
Clearfield Pa.	51,811	1,553,435	2,099,269	545,834
Hun and B. Top.	12,992	487,314	452,061	35,253
Nor. and Wta.	10,284	616,738	415,737	201,001

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Sept. 25 was 313,310 tons, of which 248,591 tons were coal and 64,719 tons coke. The total tonnage for the year thus far has been 10,886,373 tons, of which 8,399,400 tons were coal and 2,486,973 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending October 2, was 285,000 tons, of which 53,900 tons were sent to and 40,700 tons shipped from Port Richmond, and 24,000 tons were sent to and 27,000 tons shipped from Elizabethport.

The shipments from the mines of the Cumberland coal region for the week ending Sept. 25 were 70,361 tons, and for the year to that date 1,679,465 tons, a decrease of 340,387 tons as compared with the corresponding period of 1886.

Chicago.

From the Industrial World.

No relief has come as yet to make coal move. The demand from the country is large, and dealers experience no difficulty in selling coal at full card rates. Orders for delivery after the first of next month are taken subject to prices ruling at time of shipment. The retail trade in the city is also very brisk, and dealers have all they can do to keep up with their orders. Stocks are comparatively light; in fact when taken into account with the scarcity of rail coal, they are much more so than was really intended by even the closest members of the combination. The opinion is expressed that there will be no great arrival of coal before the 15th of October. By that time the east-bound grain cars will have had a chance to return, and the apple and peach crops will have been largely disposed of. So far there have been no advances in the card rates, but in all probability the prices of hard coal will go up at least 25 cents per ton at the first of the month. Lake freights have advanced very sharply during the week, having made a jump of 25 cents between Buffalo and Lake Michigan ports. The rate is now \$1.00, and with but very few exceptions has been held firm.

The above conditions apply perfectly to the Anthracite trade. Although there is no doubt that hard coal will go considerably higher, the statements now going the rounds of the city press that it will retail at \$9.00 in November is something extraordinary. Small egg continues scarce in the local yards, and in many cases consumers are obliged to get along with the larger size.

Steam coals are moving more freely, though shippers are beginning to feel the effects of the scarcity of cars as well as the anthracite men, and negotiate larger sales if prompt delivery were assured.

Values are gaining in strength all the while, and some minor changes in prices are announced. Coke is in fair and steady demand with no special features of interest. Prices are firm at about card rates.

More canal coal is being sold and the inquiry is picking up.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.

Grate	Per net ton by cartload	\$9 25
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Egg	5 25
Stove	5 80
No. 4	5 75
Nut	5 50
Lehigh Lump	7 20

BITUMINOUS.

Erle & Briarhill	\$4 15
Pittsburg	3 25
Indiana Block	2 40@2 60
" " " "	2 56@1 35
" Nut	1 65@1 80
Baltimore & Ohio	2 75@2 90
Hocking Valley	2 75@2 90
Youghiogheny	3 25@3 35
Wilmington	2 10
Blossburg	3 25
Cumberland Smithing	3 25
Somman Smithing	3 40
Grape Creek	2 00
Fountain County	2 00
Clinton Lump	2 00
Streator	2 00
Minook	2 00
Morris	2 00

CANNEL.

Kanawha	4 50
Buckeye	4 25

COKE.

Connellsville Coke	4 75@5 00
Crushed Coke	5 50
Charcoal, carload per bu.	8 50@9 25

Pittsburg.

From the American Manufacturer.

As we go to press there is a rise in the rivers which will permit the return of many empty craft, but will not likely allow of the sending out of loaded vessels. The amount of coal mined and ready to descend to the lower markets is estimated at about 7,000,000 bushels. The return of empty craft will enable the operators to employ an increased number of miners. At the railway mines the situation has undergone no material change. We continue to quote as follows:

PRICES AT PITTSBURG.

River, wholesale, on board	3 50@4 15 cts. per bushel
Railroad	4 15@4 45 cts. per bushel

AT CINCINNATI.

River, wholesale, on board	5 00@6 25 cts. per bushel
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AT LOUISVILLE.

River, wholesale, board	5 50@6 25 cts. per bushel
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AT NEW ORLEANS.

River, wholesale, on board	25@26 1/2 cts. per bbl.
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Bushels are rated among dealers here at 76 lb.—26 1/2 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4/7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke.—During the past two weeks the operators suspended operations on Wednesday and the employees refused to work on Saturdays, so there were four days of suspension during the two weeks. The small stocks that had accumulated were cleaned out entirely and the ovens are again in operation full time, and will likely so continue during the remainder of the season. Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2 25.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Oct. 2, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North	54,810.15	1,655,569.14
Shipped South	50,461.19	1,996,365.00
Total	105,272.14	3,651,934.14
For corresponding time last year		
Shipped North	76,153.15	1,665,209.97
Shipped South	60,475.04	1,817,077.18
Total	136,628.19	3,482,287.05
Increase		169,647.09
Decrease	31,355.05	

MINING NEWS.

J. W. Moore and some Baltimore capitalists have secured options on three thousand four hundred acres of coal in Rostrevor township, Westmoreland county, Pa., at an average price of \$60 per acre.

Dr. Geo. G. Green, the patent medical man, has become the owner of one thousand five hundred acres of coal land near Nelsonville, in the Hocking valley, Ohio, and thinks he will develop it shortly. The tract is entirely untouched.

A charter has been issued to the Thomas Lehigh coal company of Philadelphia, capital \$100,000, against which a protest was made by the Thomas coal company on the ground that the selection of a similar name was intended to deceive and create confusion.

All the miners of the Northern Pacific coal company, at Simi, Dakota, struck on the 25th, on account of Vice President Ball's order that employees should sign a contract forfeiting all pay due on the violation of any of the company's rules. The strikers are promised aid from Timberline, and it is thought the difficulties at that point may be repeated.

The Livingstone coal and coke company (Montana) has been organized with a capital stock of \$250,000. The mines to be operated are the Williams mines, seven miles east of Timberline, Gallatin county. The coal is of good coking quality. A coking plant of twelve ovens is in process of construction.

THE SOUTH PENN ROAD,

It or its Equivalent Certain to be Built—What the New Road Promises.

An appeal from the decision of that sturdy yeoman, Judge Simonon, of Dauphin county, in the South Penn case, was argued before the supreme court of Pennsylvania in June last, and according to precedent and the expectations of citizens a decision should have been handed down in July last, at the same time a number of other important decisions were rendered.

A delay in the rendering of this important decision of about three months has occurred, during which time the public has seen the birth of the now famous Drexel-Morgan syndicate, the object of whose creation was to be a sort of reservoir into which the bonds and other securities of the Philadelphia and Reading railroad company would be deposited by the respective owners, for safe keeping and in order that the syndicate aforesaid might reorganize the Philadelphia and Reading railroad in a manner that would do the most good for the friends of its syndicate members, without much regard, however, for the interests of the security owners.

Some people have been uncharitable enough to surmise that some connection existed between the delay in the South Penn decision and the formation of the Drexel-Morgan syndicate, to obtain control of the Philadelphia and Reading railroad by another process. The same parties claim that the delay in the rendering of the decision indicates that it will certainly be in the line of all the decisions rendered by the ablest jurists in England and America during the past two hundred years, and consequently adverse to the Pennsylvania railroad. Such surmises, however, should not be countenanced. Whatever object the projectors of the Drexel-Morgan syndicate may have had in view, one fact is today, quite apparent, to wit: they have failed to connect and to prevail on the owners of the securities to permit them to reorganize the road. Manifestly no one can reorganize the Philadelphia and Reading railroad company unless he has the owners of its bonds in full accord, and sympathy with him. Mr. Gowen held this position with the great majority of the security holders; hence he held the key to the position. At the same time Mr. Gowen appreciated the fact that it would be better, from a purely business standpoint, to have the co-operation and hearty good will of such wealthy individuals as composed the Drexel-Morgan syndicate. Such an alliance would manifestly benefit the property of his own constituents, for whose rights he has been fighting. He was therefore willing to make any fair common sense basis of settlement with his opponents, and as they had no alternative but to accept, such an alliance, however, could never be upon a basis whereby the enemies of the Pennsylvania railroad can impair the autonomy of the Reading system nor will they even be allowed to control its policy through voting trustees for five years.

The Central railroad of New Jersey and the Reading system and the south Pennsylvania or its equivalent will form a new separate and distinct competing trunk line from New York, Philadelphia and Baltimore via Pittsburg to the west, and the Baltimore and Ohio will be allowed to throw its traffic over this system of railroad from Philadelphia into New York City. Dr. David Hostetter of Pittsburg will be the new president of the South Penn or its equivalent, because the owners of its eastern connections feel this complement is due the doctor because he has purchased and still owns, in the interest of this new railroad system, some 5,000 acres on the Connellsville coke belt, on which he is about erecting a large number of ovens, to be ready for operation on or before the completion of the new line to Pittsburg.

In anticipation of an adverse decision in the South Penn suit, the allies of the Pennsylvania railroad have quickly bought up and now own nearly all of the coke belt excepting 5,000 and odd acres owned by Dr. Hostetter, and perhaps 2,000 acres additional owned by his friends. Whoever owns the acreage will henceforth control the shipments from the district, and can select the line over which this immense tonnage shall pass. The Pennsylvania railroad having obtained a taste of this effectual embargo in the Anthracite region, more particularly on its new Schuylkill Valley line, which is today useless and devoid of freight, because its competitor owns the entire acreage, has concluded through its allies to adopt the same tactics in the Connellsville coke country, so that when the new South Penn would be completed it would be effectually shut out from all coke business through adverse ownership of the acreage.

This decision will account for the comparatively recent enormous purchase of coal in the Connellsville district by well known and recognized allies of the Pennsylvania. It may be well to state in this connection that while the Pennsylvania railroad never buys and owns itself freight producing property of this description, it does far worse. It selects its favorite to whom it grants such advantages in freight rates over the general public as to warrant these favorites in buying and carrying its freight producing property for it. The

inevitable results of this policy is the erection of enormous monopolies who become wealthy by fleecing the railroad company's stockholders. It would perhaps, be more than human to expect at least some of the officers who control the granting of these favors not to invest a few dollars as individuals in such enterprises with assured profit. Numerous attempts have been made to purchase Dr. Hostetter's holding of coke lands, presumably by the emissaries of this interest; but the Doctor, after listening to what they had to say, has good-naturedly refused and still owns the land in the interest of the new trunk line.

Until the supreme court decision in the attorney general's case is handed down, the future of the South Penn railroad proper is uncertain. As the matter stands the Vanderbilts have contracted to sell their interests, together with other syndicate members, to the Pennsylvania railroad company. This latter company in turn has contracted to buy these interests. Both parties have deposited their respective securities for transfer in the hands of J. Pierpont Morgan as trustee. Before these were transferred, the attorney general entered suit to prevent the transfer, claiming the transaction was in violation of the constitution of Pennsylvania. Judge Simonon also took this view of the matter and rendered a decision accordingly. The case was appealed and is now before the supreme court for decision. If it reverses Judge Simonon's decision, then the contract is valid and the trustee will probably deliver the goods. If the supreme court upholds Judge Simonon's decision, then the transaction is illegal and void, and both parties to the contract are free to do with their securities what they please. It is improbable that the Vanderbilts would again incur the hostility of the Pennsylvania railroad by continuing the construction of the new line. The minority holders of South Penn would not continue the construction of the line with the Vanderbilts as partners, inasmuch as one dose of trickery would be considered sufficient. The Pennsylvania railroad will scarcely be willing to spend five and a half millions for the South Penn line in its present condition, together with an additional four millions to complete it, unless by so doing they would prevent the construction of a competing line.

This result would not be accomplished, because another line to Pittsburg is now laid out, which will be immediately built in order to afford the Reading its much needed western outlet via Pittsburg. A liability for unknown damages attaches today to the Vanderbilts and those who took part with them in the sale of the South Penn to the Pennsylvania railroad. The Vanderbilts, at least, would gladly free themselves amicably of this liability, and the simplest method of accomplishing this is to sell their controlling interest at a suitable price to those whom they have injured. The additional money necessary to complete the South Penn Railroad to Pittsburg or to build its equivalent has long since been pledged to Mr. Gowen, and will be forthcoming at the appointed time. The delay thus far has only arisen because the Reading and Central of New Jersey matters were in process of crystallization, and without these eastern outlets the South Penn would be useless. The reorganization of Reading is on a basis whereby its present revenues will equal 6 per cent on its entire debt, including share capital. The new contract with the Baltimore and Ohio is worth \$700,000 per year at present to the system, and in two years it is believed by competent judges will be worth to it at least \$1,200,000. The construction of the South Penn would admit of direct shipments to the west over its own lines of the entire anthracite and pig iron trade, which now goes over the Pennsylvania railroad, and will also provide for immense gas coal and Connellsville coke trade eastward.

Is Iron To Be Superseded?

Iron is the foundation of the civilization of today, the indispensable condition of all commerce and manufacture, without which no industry could exist an hour. Probably none of us have ever imagined that another state of things was possible. Yet there comes a man of science prophesying, not an iron fanatic, but a new king of industry who expects to depose King Iron.

Iron is to be "as completely superseded as the stone of the aborigines." Certainly there is a strong case made out of the new metal—aluminum. First, it is the most abundant of all substances, with the exception of oxygen and silicon. The question has hitherto been how to separate it from the compounds, but no American will doubt that, being in the earth's crust, it can and will be got out when it shall be demanded. Aluminum is light as chalk, malleable as gold, tenacious as iron, and harder than steel. It is soft when ductility is required, and when tenacity, crystallizes when hardness is required. It neither rusts nor tarnishes, is tasteless and odorless, makes numerous and satisfactory alloys, has bulk without weight, strength without size, and conductively far exceeding that of iron. Its use will open limitless prospects in all directions. All departments of building, furnishing and utensils, plumbing, bridges, railways, steamships and telegraphs would be revolutionized, and transportation gain incalculably in speed, safety and economy. Already the price has been brought within reach of the manufacturing arts, and the process of increasing the production and decreasing the cost is constantly going on.—*Ex.*

Coal and Iron in Mexico.

Minerals of all kinds are abundant in Mexico. As regards those which may be worked with advantage in that country we get some interesting information from an official report written by Senor Don S. Ramirez, entitled "Riqueza Minera de Mexico." Iron is very abundant, in spite of the large quantity now imported. In Durango is found the well-known Mercado block, which a German engineer, Herr Weidner, who examined it in 1878, estimated at a volume of 60,000,000 cubic yards, and at a value quite fabulous. Coal of various degrees of goodness has been found in many parts of the country, but serious attention has not been given to the matter until the close of the year 1880, when it was found that the only means to check the destruction of the forests for railway sleepers and fuel for the engines was to provide fitting substitutes. Hitherto the recommendation that iron sleepers should be used does not appear to have been much attended to, but a search for coal to replace wood as fuel has met with some success. The operations of the commission appointed for the purpose resulted in the discovery of some four mines of rich gas coal; of some half-dozen mines of a light bituminous coal with considerable heating power, and of three or four mines of good anthracite, as well as some twenty extensive beds of lignite. It is said that the large beds of anthracite which have long been known to exist at Barrancas and Las Bronces, in Sonora, are about to be worked on a large scale by an English company, and the Sabinas coal mines in Coahuila have already exported (1884-85) some £18,000 worth of coal for the use of the Huntington railway system. Under these circumstances it is hoped that sufficient coal will eventually be found to supply the wants of the country. Quite recently a company to work the immense beds of peat which underlie the Lake Charico, the body of water which lies farthest south in the lake system of the Valley of Mexico, has been formed in the capital. The company proposes to raise the peat and compress it into briquets by machinery, and hopes to be able to supply fuel at the rate of 60 per cent. of the present price of wood. It is thought that similar deposits of peat are to be found in other parts of the country, by the use of which it may be possible to get over one of the difficulties which has hitherto stood in the way of the establishment of manufactories in places where water-power is not available. Writing of the extent to which the soil of Mexico is pervaded with mineral substances, Senor Ramirez says: "All the states have mineral products capable of being worked and applied to industrial purposes, and they may all therefore be fairly considered as mining states."

Liquid Fuel.

The use of petroleum fuel is gradually but surely being extended. For a year or more past the Southern Pacific company have been using it on some of the ferry boats with success. The *Thoroughfare* and *Piedmont*, among the large ones, have demonstrated the success of the fuel. The *Julia*, running between South Vallejo and Vallejo Junction, has been burning oil for some time. A move of the hand regulates the flow of petroleum, which is kept at a burning temperature by a pipe of hot steam running within the oil-conducting pipe. The oil reaching the furnace is thrown into spray and burns with great fierceness. The oil is a refuse from the refinery, thick and black, not ignitable until heated to a high temperature. It is brought from Alameda to South Vallejo, and the steamer receives enough in five minutes to last all day. From 500 to 600 gallons are used each day. The large ferry-steamer *Oakland* which is running between this city and the Oakland mole, on the Southern Pacific Company route, is to be laid up soon for about six weeks to have new machinery put in so as to burn petroleum instead of coal. This kind of fuel saves the wages of several firemen, as one or two men are, with it, all that are necessary in the fire-room. The oil is easier handled than the coal, as it requires less time and a smaller gang of men to put it into the vessel. Passengers like to travel upon boats burning the oil, also, for it is cleaner than coal, as no cinders or soot are emitted from the smokestack. The owners of the Oakland cotton mills are investigating the subject with a view of burning oil there instead of coal. The use of this fuel necessitates, however, a change in the furnaces, where coal has previously been used, the same arrangement not answering well. California is now producing oil very largely and the supply is increasing. The oil is being used in places in the southern part of the state under boilers, and every month adds to the number who utilize this convenient fuel. Coal is so high here that the liquid fuel saves a great deal of money, to say nothing of the convenience in handling.—*San Francisco Exchange.*

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

THE SLIDING SCALE.

How Its Action on Wages is Regarded by the Scottish Miners.

The foreign correspondent of the *Pittsburg Manufacturer* says that while at some of the Scottish collieries there is trouble to make both ends meet, on the part whether of the employer or of the employed, both are congratulating themselves where sliding scales exist that there is no unnecessary suspension of labor. Upon this theme Mr. Ralph Young, secretary of the Northumberland miners' association, has contributed a paper to the British association, which has just closed its annual sitting in Birmingham.

The scale at the Northumberland collieries, quoting from Mr. Young's paper, was established in 1879, the disturbance in trade occasioned by constant disputes about wages having led to the appointment of a committee of miners and mine owners to consider the adoption of such a method of obviating such disturbance. A great improvement followed the adoption of the scale. From 1879 to 1884 the output increased 35.70 per cent, as against 17.55 per cent for the rest of the country.

Mr. Young holds that a scale is a much more effective way of settling wages than arbitration. The defects of arbitration, according to the Northumberland secretary, are that there can be no agreement as to how long prices are to rise or to fall before arbitration is resorted to, and there can be no agreement as to what advance or reduction is to take place for a given rise or fall in the price of coal. Both difficulties, he holds, are avoided by the sliding scale; and he estimates the greater continuity of employment as worth at least ten per cent to mine owners and miners alike.

There is a committee of the British association for collecting all possible information bearing upon wages sliding scales, and Professor Munroe is at its head. From such information as the committee have been able to acquire, they report that the original standards seem all to have been filed on a common principle, namely, to take the price of coal then realized, and the wages then paid, as representing a fair and equitable division of the produce between the mine owners and the miners, and as giving as high a wage as the industry could then afford. Other districts adopted the price of all coal sold, or the price of all coal raised, as the standard price.

The real economic difficulty in framing a scale began when it had to be determined what proportion of a rise or fall in price should go to the men and men to the mine owners. Both parties contemplated a rise rather than a fall in prices, and the changed condition of the coal and iron industry had exposed the scale to some opposition; but their wise reserve from time to time had maintained their influence with both masters and men.

The difficulties in the way of raising a scale not merely on the selling price, but on variable elements on the cost of production, were universally admitted; but there was little doubt that when one trade depended on another, variations in the cost of the raw material would require to be taken into account in fixing wages.

The sliding scale had escaped the difficulty owing to the royalties being fixed for a considerable period of time; but were a sliding scale adopted in other trades, it might not be successful, unless the price of raw material were one of the elements on which division of the profits were to depend. As further information is desired, and is promised, the committee is continued, and will further report next year, when the association meets in Manchester.

Canadian Royalty on Coal.

In reference to the royalty on coal some of the provincial papers have urged that the local government abolish it, as an unjust and heavy tax on mine operators. In urging its abolition they must have known that it was impossible for the government to do so, unless it acquired some other source of revenue. From royalty on coal the government receives the, by far, largest part of its revenue, leaving out the subsidy, and were the government to abolish it, they would land the province into bankruptcy. There is only one way in which the royalty can be abolished and that is for the federal government to give the province a sum of money yearly in lieu thereof. The royalty on coal may be looked upon as a restraint of trade, and as the federal government takes all to do with trade and commerce it should give the province a sum yearly whereby it would be enabled to dispense with the royalty on coal. It may be a little difficult to determine what the amount should be. New Brunswick several years ago derived an income from stumpage of some \$1,000,000 dollars. The Dominion government said "That tax is a restraint on commerce," and gave the province, in lieu of it, some thirty thousand dollars yearly, if our memory serves us right. In the same proportion—though she is entitled to more as the revenue from royalty is increasing yearly—Nova Scotia, in lieu of royalty, should receive one hundred and fifty thousand dollars. If the Dominion government would agree to give that sum, very likely the local gov-

ernment would be willing to accept it. This is the only practical solution of the royalty question, yet it is strange that none of the party organs,—not even the *Standard*, which is the guardian angel of the coal trade,—have ever urged upon Sir John A. and his government to come, in this way, to the aid of the operators. Our readers should note this fact as it may be useful for future reference.—*Stellarton, N. S., Trades Journal*.

Stealing Coal While En Route.

"Anthracite coal will not melt, evaporate, or blow away while in transit over a railroad," said an officer of one of the great coal-carrying companies at Scranton, the other day. "But there never was a train loaded with coal yet that reached its destination with the weight of coal it started with by a good many tons. Every station along a coal-carrying road has its complement of coal thieves. Many of them were formerly engaged in selling coal to others, the stocking of their yards the result of coal pilfered from the company. This peculiar style of dealing in coal, it has been learned, was carried on systematically in some places for years. But in spite of the vigilance of our detectives the extent of the operations of thieves along the coal-carrying railroads is still something enormous. The thieves are so shrewd and so systematic in all their operations that they can relieve a train of several tons of its cargo in the course of a few minutes. At one station alone on the Erie road not less than 30 tons of coal are taken from the cars every day, or, rather, every night, as the operations are carried on only on night trains. Trainmen have their customers along the line, and as the trains pass by certain places agreed upon a few lumps are tossed off daily, and many a ton of coal is thus disposed of from every train."

Struck Silver Quartz.

Last spring, two gentlemen, of Milford, N. J., and Capt. I. Buzzard, Bangor, purchased a large tract of land on the Blue Mountains, lying between Pen Argyl and the Wind Gap for the purpose of erecting a sheep ranch on the top of the mountain, which is several miles across and level as a floor. Later on an interest was sold to Thomas Seems and Charles Shuman, both of Bangor. The four gentlemen while inspecting their purchase, came across a chunk of ore, which on close examination resembled silver quartz. The "find" was carefully preserved by Mr. Miller, who is at present traveling, selling a line of goods in all parts of the country. While on a trip to the silver region of Colorado he submitted the chunk of ore to an expert in silver mining and was informed that the specimen was silver quartz, and a very good specimen at that. The expert was at once engaged to come east and prospect on the tract owned by the parties above named, and the result of his work was very satisfactory. A stock company, comprising the present owners, will be formed, and preparations for following up the "find" be made as soon as possible. The tract of land owned by the parties embraces several hundred acres. The expert is at the present time going over the territory making observations. The region is unexplored, and if the "find" holds out the slate regions may enjoy another boom that will rapidly populate the towns in that section.

An Important Mining Project.

The *Virginia Chronicle* says a project is now under consideration by the management of the ore-producing mines on the Comstock which, if adopted, will materially reduce the cost of the production of bullion. It is proposed to put up stamp mills in the Sutro tunnel to be operated by water power. The ore pulp resulting from crushing will be flumed to concentrators, set up on the outside of the tunnel. In many of the shafts there is plenty of water flowing from the upper levels to drive a turbine wheel with the tremendous pressure of more than 100 feet perpendicular fall. The ore extracted from the upper levels will be run out through the connecting drifts and dumped into the battery self-feeders, located in the tunnel. This will save the cost of hoisting ore to the surface by expensive machinery, of fuel for generating steam and the expense of transportation and handling the ore. In several instances, as is the case at present, it is estimated that by adopting this method Comstock ore can be extracted and be converted into bullion at a cost of less than \$5 per ton.

A collier writes to an English paper:—"And now about the great cravings for a safe lamp. If we had one (electric or otherwise) that would burn or give light in any atmosphere without danger, it would be likely to prove a curse and not a blessing, for the poor colliers would in many instances have to work in such a vitiated air, that whilst they dragged on a short miserable existence, they would be wishing for the lamp again that must have the pure air that was formerly necessary to drive off the impurities. What is better than a perfectly safe lamp is the collier well educated and the pit well ventilated."

The Severn tunnel which has been thirteen years in construction, and has cost over £2,000,000, was open this week for traffic. It is nearly four and a half miles in length, of which two miles and a quarter are beneath the arm of the sea. In its construction 75,000,000 bricks have been used. Pumps have been erected capable if required, of discharging 26,000,000 gallons of water per day.—*Iron Trade Exchange*.

THE SANTA LUCIA MINES.

How They Are Developing Wealth—Promises for the Future.

The Santa Lucia mining and milling Co., in the mining district of Santa Lucia, republic of Honduras, Central America, owns and controls thirty properties containing 49 veins, 31 of which have been worked by the natives and were abandoned because of inability to work them profitably to a greater depth for want of hoisting, pumping or ventilating machinery. All the veins worked produced with primitive methods of mining at least several tons of selected ore per day of an assay value of 80 oz. in silver or more, as they could not have been profitably operated treating the ores in the native chumbos or furnaces. One hundred and forty bushels of charcoal are required per ton in these crude smelters, and the percentage of loss of bullion as compared with improved machinery is very great. The company is now doing development work on a number of these abandoned properties, and will be able to furnish 25 tons of selected ore per day by the time the milling plant can be erected. There is an inexhaustible supply of \$30.00 concentrating ores in the old workings, left in by the former operators, which was of too low grade for them to work.

It is not a question of ores in the Santa Lucia district. It is simply a matter of improved machinery and skilled and educated management in mining and reduction.

Hernando Dias, a native of Honduras, who resides in Santa Lucia, is operating with native methods on the San Martin vein, about a mile north of us in this mining district. His work consists of a series of "Posos," or shafts in steppes each step being about 15 feet, up which the natives carry the ore, in raw hide buckets on notched logs, some three hundred feet. Their mining tools are an iron bar about three and a half feet in length and a wooden mallet. At the surface the ore is broken into small pieces with a hammer and selected for treatment. His output is necessarily very limited and is not more than 30 tons of selected ore per month. This he calculates costs him \$30.00 per ton to mine and treat, and his profits are about \$1000.00 per month. His selected ore assays about \$80.00. He has had ores much richer, when his profits have been much greater. If he can make \$30.00 per ton out of \$80.00 ore on an output of a little over a ton a day, with his crude tools and appliances, we can certainly make much more per ton with improved mining and reduction machinery, with an output fifty times as great. Mining on correct methods and treating with smelters of improved pattern under skilled and experienced superintendence, the profits Dias makes out of \$80.00 ore can be nearly doubled.

According to the apparently well authenticated history of many of these properties, which is substantiated in several instances by the official records and also by the testimony of men now living and working for the company, they have produced large quantities of very high grade ores. The "Trinidad" vein of the "Santa Anna" mine, now being reopened, yielded selected ore assaying over 1000 oz. to the ton and the "Pais" which will be cut by a tunnel below the old works, which the court records show were down 344 feet when the pillars were robbed, yielded ore averaging 160 oz to the ton and the pay streak ran up to 3,200 oz. per ton. This tunnel had been driven 500 feet by the natives when abandoned. The Company will have to drive it 300 feet further to cut the "Pais." The tunnel, which the company has restored, in the 560 feet driven by the natives, cuts the two veins of the Gatal property, also owned by the company. These veins have been worked by the natives as far as they could work them without ventilating machinery. It is intended to ventilate and work them.

The topography of the district is such that all these properties can be done in their pay shafts below the old workings by tunnels. Some of these tunnels will be long and expensive, but they will not be undertaken until the company has earned a surplus for development. The selected ore estimated upon can be obtained with comparatively inexpensive development.

The average value of the product of the company may be much higher than has been estimated upon when the net earnings will be proportionately greater.

The property is so extensive that the daily production of ores can be advanced from 25 tons of selected ore and 50 tons of concentrating ore, as here indicated upon, almost indefinitely as the development work is extended and the concentrating and smelting plant is added to. On a daily production of 350 tons of concentrating ore and 175 tons of selected ore the net annual earnings will exceed \$3,500,000.

The property can also be conveniently divided into groups of mines upon which sub-companies can be organized. When the enterprise is placed upon a paying basis and public attention is attracted to it, as it is certain to be, at least three sub-companies can be provided for upon highly advantageous terms to the parent company—without restricting its mining or smelting to itself.

The iron trade is booming.

miners in the employ of the ironmasters are restricting the production. Some firms declare that they will stop the pits and the furnaces rather than pay higher wages, which the prices of iron do not warrant. But it is significant that the Coltness and Glasgow iron companies have now granted the miners the 6d. per day advance which they lately refused.

Not to be behind her neighbors, Illinois announces the discovery of additional valuable deposits of lead near the worked out mines at Gatena. An unusual feature in this case is that the freshly discovered lodes belong to six poor miners, who, if they succeed in retaining the property in their own hands, will be made millionaires thereby.

At the American institute fair in New York, F. Van Fleet, of Williamsport, has on exhibition what is supposed to be the smallest complete working locomotive in the United States. It is built of gold, silver, German silver, brass, steel, copper, iron and nickel, and is, including tender, only nineteen inches in length.

HARMONY is said to have been restored in the Reading reorganization committee, and the work of rehabilitating that great enterprise in the interest of its real owners will now go on uninterruptedly. It is likely the Gowen plan will be carried out to the letter, and the road be put upon a solid financial basis at an early day.

The coke operators of the Connellsville region have virtually surrendered to the miners in the matter of shutdown days. Last week the syndicate gave orders to work on Wednesday. Having forced the operators to acquiesce, the miners are expected to work on Saturdays hereafter.

PROBABLY if coal was more promptly unloaded from cars at points of destination there would be less cause for complaint on the part of colliery managers of scarcity of transportation facilities.

THE Scranton *Truth* started a relief fund for the widows and orphans of those who lost their lives in the Marvins shaft. The amount already subscribed is in the neighborhood of \$500.

AFTER expending \$8,000,000 in surveys, it is to be expected that a country of the magnitude of the United States should have a correct map, yet it is without a single one.

LEHIGH coal operators advanced wages this week in accordance with the increase in coal prices. This chokes off the strike said to have been impending.

THERE are indications that we have shipyards in America after all which can turn out a decent iron or steel vessel.

BANKER NESBITT, of Wilkes-Barre, wants to lease some good coal lands on a fifty cent royalty.

THOSE fellows who want a general division of property usually have none to divide.

IN THE MAHANAY VALLEY.

Outlook for Business At Its Numerous Collieries—What They are Doing.

The Gilbert colliery, as far as its resources are concerned, has coal enough for the next 30 years, and that too in quality and quantity to equal any colliery in the region—it has the mammoth in splendid condition, and all the smaller seams can be worked, and made to pay. A little haste in this colliery, say by the robbing of the mammoth before the Holmes and Primrose are worked, may destroy the value of this property, but still the coal resources are immense, and although the accident of last week will retard the work a little yet, the P. & R. C. and I. Co. have determined to open out this colliery, and before very many months have elapsed this will be a model operation. Machinery of the most improved order and largest pattern are in course of construction, and the Gilbert colliery of the near future will more than double the shipping and employment roll of the present. The Draper colliery is similarly situated, has the same seams to work, and although the top rock may not be as

good as in the former colliery, yet, its resources are equal to those of the Gilbert colliery, and its supply of coal should be good for the same period, at an equally increased shipment. These two collieries can be made equal to any two collieries now in operation in the valley. The Laurel Ridge colliery is doing a profitable business on a small scale working the crops of the mammoth and is good for increased shipments for some time, while the South Laurel Ridge colliery, working the Buck Mountain seam, gives indications of a great improvement in the quality of the coal and the prospects are bright for 30 to 40 cars a day from this colliery. The Stanton colliery has a good supply of coal, and can keep its shipments up for some years. The coal shipped from this colliery while under the proprietorship of Miller, Hoch & Co., won an enviable reputation in the market, and there should be no sound reasons why it cannot maintain its standard for some years to come under the present efficient management. The Lawrence colliery for some time has been in what may be termed a preparatory condition, that is, the proprietors have been expending a large fortune during the past eighteen months in preparing this colliery for greatly increased shipments. The venture of this firm is commendable. At a vast outlay they have at last the gratification of seeing the operations assume ship shape and in the course of a few months their shipments will exceed the record of this colliery in the past. The Bear Ridge; well, here is the sticking point. The coal in these collieries exceeds in quantity and accessibility that of any colliery in the valley. When these collieries were opened by the West Bear Ridge Co., the idea was entertained that by a certain mode of mining the whole mountain of coal could be made to run into the chutes at once. It was experimented on and resulted in a failure. The P. & R. C. & I. Co. took possession and made extensive and expensive improvements; pumps, &c., of the most improved pattern were built, and today there is in the West Bear Ridge colliery, laying on the second lift, enough coal to last for ten years, shipping sixty cars a day. The improvements at this colliery were stopped so suddenly, and at such a peculiar time, that our practical men are at a loss to account for it. The property was purchased from the West Bear Ridge Coal Co., but unfortunately the financial embarrassment of the purchaser was such, that the contract could not be carried out, and as the rumor now runs, a powerful corporation is negotiating for the lease. West Bear Ridge will most undoubtedly be in the near future one of the best and most profitable collieries in the region. But two lifts have been worked, the second of which is good now for ten years. By sinking a slope 100 yards, and driving a tunnel southward into the north dip they will have the two lifts on the mammoth seam. This with the little seams will give the company coal enough for the next forty years, and the quality of the coal is such that any person with any knowledge of mining tells you that it is nothing short of a financial necessity that keeps this colliery idle. It will be one of the cheapest and best paying collieries north of the mountain. The question that most seriously affects our interests is how long will it be before the parties able and competent to take advantage of the opportunity will take hold.

HAYES' SQUIBS.

Their Merits Call for Another Factory to Supply the Demand.

The one great desideratum in the perilous life of a miner is a safe and reliable fuse or squib for the setting off of his blasts. Of all the mine casualties of the coal region, the greatest percentage and usually the most fatal are those which flow from premature blasts, or the "hanging fire" of a squib in a charged hole. Various patents have been taken out for the manufacture of a squib that could be depended on at all times to do its work with safety to the collier, but only in rare instances have they stood the test. Changes of weather, atmospheric influence, mine dampness or dryness, with various other causes, have acted on them to their detriment and the users have suffered. One exception to the rule has been the "Hayes squib," manufactured by George Hayes, at Girardville. It is the outcome of a practical miner's careful study and most exacting experiments, resulting in the production of an article that comes as near perfection as it is possible to do. It has been received with so much favor that for months past the manufacturer's resources have been overtaxed to supply the demand. Mr Hayes gives his own personal supervision to the making of the squibs, and to this fact is due the measure of reliability they have gained. So long as he is able to do this he fears no failure in the service. In his Girardville factory a large number of workers are employed, yet they cannot keep up with the market calls. To remedy this Mr Hayes is about to open a branch factory at St. Clair, fitting it out in every respect co-equal with his present place, and guaranteeing the same excellence in its products. The success he has gained in his business has been well earned by Mr. Hayes and the HERALD congratulates him on its enjoyment.

A fine lubricant for machinery of any kind can be made by putting pure olive oil into a clear glass bottle with strips of sheetlead, and expose it to the sun for two or three weeks, then pour off the clear oil, and the result is a lubricant which will neither gum nor corrode.

IRON AND COAL.

Not Enough Cars to Haul Fuel—Advancing the Prices For the Product.

The Reading, Lehigh Valley and Pennsylvania railroad companies are still complaining of the scarcity of equipment. The officials of the Pennsylvania state that their lack of equipment is principally in the hauling of fuel, which amounts to over 50 per cent. of their entire business, and that notwithstanding the fact that they are turning out cars at the rate of from thirty to forty per day that they find it difficult to get them out fast enough to meet the requirements of their fuel trade. The Lehigh Valley and Reading companies attribute the scarcity of equipment with them in the transportation of coal to the large increase in this branch of their business, diverting the coal cars to other fields where a trade has been developed within the last year. The Reading has diverted a large amount of its coal equipment to the Anthracite business, which it is now doing in Washington and Baltimore over the new Baltimore and Ohio route from Philadelphia.

The recent advances in the price of anthracite coal will probably have an injurious effect upon the manufacturers of iron in the Lehigh and Schuylkill valleys, where anthracite is the principal article of fuel. The majority of the furnaces in the Lehigh and Schuylkill regions, in consequence of the advance in coal, have made an average advance of twenty-five cents per ton on their product, but it is thought to be extremely doubtful if it can be maintained.

The work of developing the large iron tract in the Kittatinny valley, Centre county, this state, consisting of nearly fifteen hundred acres, which was recently purchased by a syndicate representing \$1,500,000, has actively begun. The Pennsylvania RR. Co. will have a line completed into this plant by next year. Private capital has just completed and will have in operation next week what is known as the Bellefonte, Buffalo Run and Bald Eagle railroad. This will drain a large ore tract adjoining that in the Kittatinny valley.

The Pennsylvania railroad company will have its line into the anthracite coal regions of Schuylkill county completed by October 20. At that time the entire line will be opened, with connections to the Lehigh Valley railroad and on to the Nanticoke region. It is expected that the Reading, in order to have the present rate of tolls preserved, will give the new line about 600,000 tons of coal to carry.

A BIG LAW-SUIT.

Ex-Lessee of Taylorsville Colliery Fighting for Damages.

A lawsuit involving a claim of half a million dollars damages was begun in court Monday, before Judge Green. Complainants are Thomas H. Shollenberger, Richard Parcell and Augustus H. Shollenberger, and the P. & R. coal and iron company is the defendant. The suit is based on a breach of covenant, by which the complainants claim to have sustained losses equal to the damages asked. In 1870 Shollenberger *et al.* leased from the Manhattan coal company the Taylorsville colliery, in the Heckscherville valley, formerly operated by John McGuinness and others. The lessees covenanted to sink the slope to the basin and drive tunnels to cut two or three other seams, the coal company covenanting on their part to put in the necessary pumps, &c., to keep the colliery in a workable condition. While these improvements were in progress, the Manhattan coal company, in January, 1883, sold out to the P. & R. coal and iron company. The lease of Shollenberger & Co. however, bound the heirs, assigns and successors of the Manhattan coal company to the terms of the agreement, and when the property fell into the hands of the coal and iron company the lessees notified them to carry out its stipulations. The complainants allege that the company temporized with them, suggested alterations in the manner of working which resulted in serious loss to them, and finally got possession of the colliery and worked it.

By reason of the failure of the company to carry out the provisions of the lease, plaintiffs claim they suffered damages to the extent of half a million dollars.

The suit was instituted twelve years ago, and in 1876 a board of arbitrators awarded Shollenberger & Co. \$4,000. An eminent array of counsel is engaged in the case, including ex-Judge Walker, Hon. John W. Ryan, ex-Judge Ryan, George R. Kaercher and Guy E. Farquhar.

Even the Indians on the Pacific coast have caught the anti-Chinese fever. A large force of their recently struck work while hop picking on a ranch on White River, W. T., because twenty-five Chinamen were employed, and the proprietor had to finally discharge the Chinamen in order to get the Indians to return to work.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Mensuration.

Editor Mining Herald and Colliery Engineer:

SIR:—Having been working out a few problems in mensuration and thinking they may be of interest to some of your numerous readers, I submit the following questions thus:

To find the circumference.

1st rule:

say as 7 : 22 :: the given diameter : circumference; or, as 113 : 355 :: the diameter : the circumference; or, as 1 : 31416 :: the diameter : the circumference.

2d rule:

say as 22 : 7 :: the given circumference : the diameter.

or, as 355 : 113 :: the circumference : the diameter; or, as 31416 : 1 :: the circumference : the diameter.

Example: The diameter of a circle is 15; what is its circumference?

7 : 22 :: 15 : 22 × 15 ÷ 7 = 330 ÷ 7 = 47.142857; or, 113 : 355 :: 15 : 355 × 15 ÷ 113 = 5325 ÷ 113 = 47.124;

or, 1 : 31416 :: 15 : 31416 × 15 = 47.124.

Example: The circumference of a circle is 80; what is its diameter?

22 : 7 :: 80 : 7 × 80 ÷ 22 = 25.45.

355 : 113 :: 80 : 113 × 80 ÷ 355 = 25.4647.

31416 : 1 :: 80 : 80 ÷ 31416 = 25.4647.

To find the area of a circle.

Rule 1.—Multiply half the circumference by half the diameter for the area.

Rule 2.—Multiply the square of the diameter by .7854 for the area.

Rule 3.—Multiply the square of the circumference by .07958.

Rule 4.—As 14 is to 11 so is the square of the diameter to the area.

Rule 5.—As 88 is 7 so is the square of the circumference.

Example: To find the area of a circle whose diameter is 100 and circumference 314.16. Answer.

By rule 1.— $314.16 \times 100 \div 4 = 31416 \div 4 = 7854 = \text{area}.$

By rule 2.— $10000 \times .7854 = 7854 = \text{area}.$

By rule 3.—Square circumference 98696 ÷ 5 × .07958 = 7854 = area.

By rule 4.— $10000 \times 11 = 110000 \div 2 = 55000 \div 7 = 7854 = \text{area}.$

By rule 5.—Square circumference 98696 ÷ 5 × 7 = 690875 ÷ 8 = 86359.4 ÷ 11 = 7850.85 = area.

Of the ellipsis: To find the circumference of an ellipsis by having the two diameters given.

Rule. Multiply the sum of the two diameters by 1.5708 and the product will give the circumference nearly; that is putting t for the transverse, c for the conjugate, and p for 3.1416; the circumference will be

$$(t + c) \times \frac{1}{2} p.$$

Example let the transverse axis be 24, and the conjugate 18; required the circumference or perimeter.

$$(24 + 18) \times 1.5708 = 42 \times 1.5708 = 65.9736$$

is the circumference nearly.

Example 2.—Let us take the example given in a late HERALD. Let the transverse axis be 16.6 and the conjugate 12.8; required perimeter.

$$(16.6 + 12.8) \times 1.5708 = 29.4 \times 1.5708 = 46.18152.$$

There is a slight difference in the decimal to what was given in the HERALD. If above be of any service to some of your readers, I will be repaid for my labor. I am,

Yours Truly,

C. M.

Camden, Pa., Sept. 29, 1886.

Power to Raise Water.

Editor Mining Herald and Colliery Engineer:

SIR:—Please publish the following answers to the questions asked by "Alycthus," West Elizabeth, Pa.

Ques. 1.—How many gallons of water would be required to raise 4000 cubic feet of water per hour from a mine 180 fathoms deep?

Ans. 1 cubic foot of water = 6.24 lbs.

180 fathoms = 1080 feet;

then weight of water to be raised per minute equals

$$4000 \times 6.24 = 4166.6.$$

Depth of pit in feet = $180 \times 6 = 1088$;

$$\text{then } \frac{1080 \times 4166.6}{33,000} = 136.3 \text{ H. P. Ans.}$$

Ques. 2.—How many gallons of water would a steam engine of 5 horse power raise from a depth of 200 fathoms in one hour?

Ans. 1 gallon of water = 10 lbs.

One hour's work of engine expressed in units equals

$$5 \times 33,000 \times 60 = 9900000$$

$$\frac{5 \times 33,000 \times 60}{10 \times 200 \times 6} = 825. \text{ Ans.}$$

Ques. 3.—What must be the horse power of an engine to pump 87 feet of water per minute from a depth 60 fathoms?

Ans. 1 foot of water weighs 62.5 pounds.

$$\text{Then } \frac{62.5 \times 87 \times 60 \times 6}{33000} = 59.4 \text{ H. P.}$$

Hoping the above are satisfactory, I remain,
Yours Truly,

C. M. G.

Camden, Pa., Sept. 29, 1886.

Wants the Quantity.

Editor Mining Herald and Colliery Engineer:

SIR:—Will some of your able correspondents answer the following questions?

1. If a self-acting incline six hundred yards long with a grade of $\frac{1}{4}$ inches per yard will run down 100 tons in eight hours, how much will a self-acting incline four hundred yards long, with a grade of three inches per yard, run down in ten hours?

Respectfully yours,

H. M.

Smithton, Westmoreland Co., Pa., Sept. 27, 1886.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you please insert in your next issue the following questions?

1. The total rubbing surface of a circular shaft is 15,708 feet; the shaft is 500 feet in depth and the velocity of the air current in the shaft 8 feet per second. What is the total amount of air passing through the shaft per minute?

2. If 8,100 cubic feet of air passes through a square airway 81 feet area, what quantity will pass through a square airway 32.5 feet area, the pressure being the same in each case?

Yours, &c.,

A LEARNER.

United, Pa., Sept. 28, 1886.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—I hope that Mr. Robert Mauchline has not quit writing for the MINING HERALD. I hope he will explain some of the formulae relating to fans. I would like him or some other of your able correspondents to answer these questions.

1. A fan 15' feet in diameter is making 100 revolutions per minute, and passing 25,000 cubic feet of air per minute, what is motive power, independent of engine and journal friction of fan expressed in foot pounds per minute, producing the current?

2. A fan 10 feet in diameter is making 120 revolutions and passing 20,000 cubic feet of air per minute through an airway 7x5 feet and 1024 feet long when the airway is 2427 feet long, fan running at same speed is passing 15,000 cubic feet of air per minute, what is the proportion of depression produced by the fan to the depression due its peripheral velocity?

3. A fan 12 feet in diameter making 100 revolutions per minute and giving a depression of .522 due to peripheral velocity, is passing 12,000 cubic feet of air per minute through an airway 7x7 and 5131 feet long, what is the proportion of depression used in passing the air through the fan and expelling it into the atmosphere, to the depression used in passing the air through the mine?

4. A fan 8 feet in diameter and making 150 revolutions per minute and giving a depression of .614 due to peripheral velocity is passing 15,000 cubic feet of air per minute through an airway 6x6 feet and 2388 feet long, what is the combined resistance depressed in head of air column, caused by the expulsion of air into the atmosphere and its friction in passing through the fan?

Please answer and explain formula.

Yours, etc.,

IGNORAMUS.

West Newton, Pa., Sept. 30, 1886.

Pointing Out the Shoals.

Editor Mining Herald and Colliery Engineer.

SIR:—I read a good article in a recent issue of your paper by William Seddon, of Brownsville, Pa., in regard to forming an association of mine bosses. Organizations of this character are a necessity in all inspection districts, and the least valuable of them would do much good. The trouble, however, is to get men to attend; even when an interest is excited it is only temporary and soon goes down. The members are, as a rule, not ready writers and cannot be induced to write.

To make such organizations a success requires a broader educational foundation than now obtains

among mine bosses. A few years ago I read with interest of the organization of a mining institute in the Anthracite region of Pennsylvania. At first there were good meetings but after a while there was nothing of it. About the same time a similar institute was formed in Ohio and today this society is stronger and in a better condition than ever. Now what is the reason that the Pennsylvania institute went down, while the Ohio one succeeded? The answer is found in the educational and scientific status of the members of the Ohio society. We took in men of science, geologists, chemists, metallurgists, students of mining schools, as well as mine superintendents and mine bosses. Our practical men listen with the keenest interests to the scientific men, and our scientific men derive information and practical ideas from our mine bosses and superintendents.

If our institute was composed wholly of mine bosses, it would soon cease to exist for lack of interest in its proceedings, I fear.

I do not write the above with any purpose of discouraging the proposed organization referred to by Mr. Seddon, but to show the necessity of liberalizing the field of action. The mine inspector of a district may, from his personal standing and relations to the mine bosses of his district, keep an organization together for a year or two, but I fear it would eventually go down unless the membership embraced all the talent connected with mining, such as geologists, chemists, &c., as is done in the Ohio institute.

Yours, &c.,

ANDREW ROY.

Glen Roy, O., Sept. 27, 1886.

The Glen City Colliery.

The mines at Glen City, Columbia county, Pa., which have long been idle, pending the settlement of legal difficulties, are now to be worked to their fullest capacity. For a period of twenty-five years or more there has been an action in the courts concerning this colliery, and especially during later years. James McAlarney and wife, of Plymouth, have won the suit on each occasion, and the colliery has been acquired by a number of young men, who have formed the Glen City coal company, consisting of Joseph Sweitzer, George McAlarney, of Plymouth; George P. Knight, of West Pittston; Frank Bittenbender, of Nanticoke, and a Mr. Derby. They have recently constructed a switch over one mile in length running from their mine to the Catawissa branch of the Pennsylvania railroad, over which they will ship their output. They are now developing a seam of coal 14 feet thick. This seam is thought to be the Primrose, as it is in every respect the counterpart of that seam at Mount Lafee, Schuylkill county, which Mr. McAlarney worked away back in the '40s. The coal is remarkably pure, not a particle of slate being found herein. The managers are now re-arranging the plant in several directions. The colliery is now producing anywhere from one hundred to three hundred tons per day, and with the improvements under way this will be increased. They have five hundred and fifty acres of land under lease and additional leases and means of controlling something like two thousand eight hundred acres more. The men who now have this colliery in hand will rapidly develop the mine in every direction and have plenty of capital at hand for all purposes. The result will be one of incalculable benefit to Glen City, especially as that place has seriously felt the effects of the closing up of the mines during the year past.

Adoption of Steel Sleepers in Collieries.

Many roads are now using steel sleepers, in Belgium, France, Germany, and in England. An important field for the sleeper lies in the direction of collieries. It is well known to all mining engineers and managers of collieries that a large sum of money is annually expended in the maintenance of wooden sleepers and tramways underground, and steel sleepers would seem to possess great advantages for this purpose. A strong yet light corrugated steel sleeper, with a special steel clip for fastening, for colliery purposes, has been patented by James Colquhoun, general manager of the Tredegar iron and coal company, of South Wales, and was recently exhibited. In this sleeper, two holes are punched in each end, and the steel clips are put in after it is laid, the rail being keyed up by a steel taper key. The corrugated sides of the sleeper, with the two projecting flanges at either end, enable it, when laid down, to become very firmly attached to the ballast or road, thus preventing any movement when loads are passing over sharp curves. The weight of the sleeper, with two steel keys and clips, is 16½ lb. It is stated to have been at work for some time in collieries in South Wales, where sharp curves and steep gradients exist, and has been found to work very satisfactorily.

No one will dispute the desirability of a gaseous over a solid fuel. Natural gas has given the impetus to thought upon this most important subject; and it may be set down as a substantial fact that the days of solid fuels for many purposes are numbered, and that we shall soon usher in the new candidate for public favor, and transform all the solid fuels into gaseous before using. In this respect, the Anthracite coal, combining, as it does, the largest per cent. of carbon—from 80 to 94 per cent.—will lead all in the contest for supremacy, and to which in cheapness and effectiveness, natural gas will bear no favorable comparison.—*Saward's Coal Trade.*

IN COAL.

GENERAL ITEMS PERTAINING TO THE MINING OF THE MINERAL.

The Fall Brook coal company has fifty-six locomotives.

Four thousand loaded coal cars are said to pass Port Carbon daily.

A coal seam is being developed at Mainville, Columbia county, Pa.

Downingtown has organized a lodge of labor, with a membership of 300.

Drifts have been operated at Admiralty City, and the coal is said to be of the best quality.

The Swedish miners at Antrim, Pa., have hired a teacher who has now about forty pupils.

The coal reserve under Tremont, Pa., has been sold to Stephen W. Dorsey, of Scranton, for \$25,000.

Slemmer & Co.'s Pinedale colliery, near Middleport, Pa., idle since July 15, resumed operations.

A charter has been granted at Harrisburg to "The Thomas Lehigh Coal Company," of Philadelphia. Capital, \$100,000.

It is interesting to read that Pennsylvania nut coal is worth \$25 a ton at Deadwood, Dakota. That is the market to strike for.

Henry Graves, who lives three miles northeast from Alma, Kansas, has discovered a twenty-six inch vein of coal upon his land and is making preparations to mine it.

A number of new coke ovens are being erected at Arnot. The coke trade is brisk and in order to keep up with the demand the company is forced to erect these new ovens. There are over 200 in operation already.

The Parsons coal company are sinking a shaft 2½ miles south of Cherokee, Kan., and the Western coal mining company at the same place have let the contract for the building of twenty three houses at Fleming, for the use of their miners.

The Elizabeth, Pa., *Herald* says; The introduction of natural gas knocked the bottom out of the nut coal trade, but it made cheap coal for home consumers. A good quality of nut coal is being put up in coal houses here at \$3 a bushel. This is just about \$1 a ton.

Coal in small quantities has been found in Rice county, Kansas, upon the land of a Mr. Carnahan at a depth of 17 feet. Coal has been found twenty-five miles northeast of Humboldt, same state, at a depth of twenty-five feet, the vein said to be four feet thick.

Coal miners frequently find curious formations in a vein of coal. An Arnot miner took out a piece of sulphur a few days ago which was a perfectly formed ear of corn, the kernels and rows being very distinct. It was under twenty feet of solid rock and in the middle of the coal vein. — *Wellsville Agitator*.

The Mt. Carmel News says that W. T. Montelius and John B. Reed, have returned from an inspection of West Virginia lands in Fayette county and have decided to lease in the tract near future begin the mining of bituminous coal. The land is close to the tract owned by the Buerys of Shamokin.

At a meeting of the Pittsburg coal exchange last week, the proposition of the river miners to submit the question of wages for the fall "run" to arbitration was rejected unanimously. The miners are now getting 2½ cents per bushel, but think the price should be advanced during the winter. No demand, however, was made.

A SPREADING STRIKE.

MASSACHUSETTS LEATHER WORKERS ENGAGED IN A STRUGGLE.

WOBURN, Oct. 1.—The agreement and price list between the manufacturers and the Knights of Labor of this city expired last night by limitation, and it is thought that there will be a lockout in nearly all the factories similar to that now existing among the tanners of Salem and Peabody. If so there will be great destitution in town before spring, as most of the workmen are poor and have spent a great deal of money in aiding their brethren in other towns. The labor fight is the most important and aggressively contested in the history of Woburn, which is the chief centre of leather making in New England. Between 4,000 and 5,000 men are

interested in the war here alone, but as the Knights of Labor at Stoneham, Winchester, Lexington, Concord, Medford and a number of other places near by have also been ordered by the executive committee of the organization to stop work, the entire army of malcontents will aggregate somewhere near 8,000.

STORE ORDERS VALID.

THE SUPREME COURT DECLARES THE ACT OF 1881 UNCONSTITUTIONAL.

PITTSBURG, Oct. 4.—In the state supreme court, which met here today, Justice Gordon decided that the store-order system, under act of June 29, 1881, was unconstitutional and void in as much as by it persons are prevented from making their own contracts. In his opinion, Judge Gordon says: "The act is an infringement alike of the rights of employer and employee, and it is an insult to attempt to put the laborer under legislative tutelage, which is not only degrading to his manhood but subversive to his rights as a citizen of the United States. The decision was rendered in the case of Godcharles & Co. vs. Frank Weigman, of Northumberland county. The judgment of the lower court was reversed and a new trial ordered. The decision caused a great deal of comment in labor circles today. Thomas A. Armstrong of the *Labor Tribune*, advises every labor organization in the state to make a determined fight against the store order system. John Costello, president of the Pittsburg miners' association said: "The decision will be startling news to the miners. They must necessarily begin a warfare against the pernicious system."

BELGIAN STRIKERS.

A SEVERE SENTENCE REVERSED AND A NEW HEARING GRANTED.

BRUSSELS, Oct. 1.—The supreme court had before it today the important case of Oscar Falleur and Schmidt, the popular glass workmen, whose condemnation last month to twenty years of penal servitude for the alleged instigation of the Charleroi strike outrages in March caused such irritation among all the workmen and led them to clamor for amnesty as well as universal suffrage on the occasion of the great demonstration of August 15.

The advocate general agrees with the counsel for the defence that the sentence of the Mons tribunal is invalid on technical grounds. The court will give judgment to-morrow. It will acquit the Mons sentence and order a fresh hearing before another court—which will give great satisfaction to the working classes.

Coal Operators Assigning.

PITTSBURG, Oct. 1.—Carlin, Berhaue & Co., operating the Eclipse coal mines on the Wheeling division of the Baltimore and Ohio road, have made an assignment. Owing to competition with the Hocking valley in Ohio they are compelled to make contracts as low as ninety cents a ton. The assignment of other operators from the same cause is predicted. The actual cost of producing a ton of coal at the Baltimore and Ohio mines is said to be \$1.04, of which the miners receive seventy-one cents. Operators say there is a lesson in this for those who are agitating for higher wages.

Another Advance.

NEW YORK, Sept. 30.—The coal managers met today and advanced prices on egg, 10 cents; grate, 5 cents; stove, 15 cents; and nut, 10 cents. The representatives present were: F. P. Holden, of Lackawanna; W. H. Sayre, of Lehigh Valley; J. F. Williams, of Lehigh and Wilkes-Barre; J. C. Hurst, of Delaware and Hudson; R. H. Williams, of Erie; Thomas M. Richards, of Reading; C. H. Mead, of Pennsylvania coal company; F. A. Potts, of New York, Susquehanna and Western; and E. B. Ely, of Cox & Bros. & Co.

Terrible Colliery Disaster.

LONDON, Oct. 3.—A terrible explosion occurred on Saturday at Alfotia colliery, near Wakefield, Yorkshire. Seventy-seven men were found dead, eight have been rescued and seventeen are missing. In all probability the missing seventeen lost their lives.

A MONKEY ACTS AS WATCHMAN.

An African Railroad's Ape Earns a Salary for His Crippled Master.

Two years ago when I was in South Africa for a New York firm of exporters I was informed that eight miles up the railroad, which runs from Capetown north, there was a trained ape which acted as a switchman and drew a regular salary for his master.

Of course I believed the story to be a canard, but felt that it was worth while investigating. I stopped at a little station on the railroad in Cape Colony and was directed to a small switch house, 200 yards up the track from the place where the train had stopped. The switch tender was sitting out side the door in an armchair, and by his side stood, or rather crouched, an enormous African ape, which was fully five feet high when erect.

As the switch tender arose to answer my inquiry I noticed that he was armless. I asked him whether it was true that his ape performed the duties of switchman and was told to watch for five minutes and see for myself. A few minutes later the rumbling noise of an approaching train was heard. As the noise increased the ape jumped from his crouching position and accompanied the switchman to the place where the white arm of the switch stood thrown to the left.

At a signal from the switchman the ape jumped forward, seized the key, unlocked the padlock which held the switch in position, and grasping the lever with his muscular arm, swung it to the right. The ape then laid over the switch to the side track of the station, and in a second the switch was thrown back into position, and the ape again took his seat by his master to wait for further orders.

It was certainly a wonderful performance, and I would not believe it unless I had seen it. The man informed me that he had lost his arms in a railroad accident while employed by the company as a switch tender. During the five years previous to the accident he had trained the ape, more as a matter of recreation and to employ his leisure time while stationed at that lonely outpost of the Capetown railway.

The work of amusement turned him in good stead when he was able to satisfy the company that without arms he could as fully protect its interests as when he was in possession of those limbs. For more than two years the ape had performed the duties of switchman, and had never made a mistake. More than this, the ape was trained to feed his master, as well as to dress and undress him, when necessary. —Omaha Bee.

Billiard Playing of the Demented.

A party of friends of the demented billiardist, Joseph Dion, went to the Bloomingdale asylum to see him. They found him in the billiard room of that institution at play with Bartley Campbell, the insane dramatist. These two patients are doomed to die of progressive softening of the brain and, alike, their chief symptom physically is paresis, or an inability to control their motions. For instance, neither can now legibly write his name. Thus, under their billiard play was necessarily erratic. A match was proposed and the irrational contestants at once began. Each was perfectly confident, and their wild talk, often branching off to utterly foreign subjects, was a steady accompaniment of their shots. In health Campbell had been a reasonably good player, but now his efforts were more awkward and futile than those of a beginner.

Curious interest centered in the game of the once expert Dion. It was strangely uneven. Once in a while several successive shots were positively brilliant, and especially was this so when the position of the balls, striking his mind at a glance, was instantly comprehended and acted upon. If he delayed at all in deciding what caroms to undertake, his mind lost all continuity of thought, and he used his cue in a dazed, ridiculous manner. The same peculiarity was observed in his lack of complete control of nerves and muscles. If he made a shot quickly it was apt to be sure and steady, but a delay resulted in utter confusion and failure. All through the strange game Dion maintained the most dignified demeanor, and was seemingly unaware that his play was not as good as ever. He fancied part of the time that Campbell was some noted billiardist, now Vignaux, now Daly, and so on through the whole list of champions; and once he declared that the match was for the possession of the asylum, which he believed to be a royal palace in Spain. He is not expected to live more than a year. Campbell's time is thought to be still shorter. —New York Star.

September's Mine Accidents.

During the past month thirty-six accidents were reported to Mine Inspector Williams as occurring in the mines of the Wilkes-Barre district. Only two of these resulted fatally. John Hourat was killed by a fall of top coal at Colliery 5, Plymouth, Sept. 10, and John Williams was fatally injured by a premature blast in the Empire, Sept. 13.

IMPROVEMENTS.

WHAT IS BEING DONE AT COLLIERIES FOR THE FUTURE.

The Parrish coal company is erecting a large brick engine house at its new works in Plymouth.

Some improvements are going on at the Delaware and Hudson canal company's above Wilkes-Barre.

The Delaware and Hudson canal company's collieries at Plymouth are being provided with several new cylindrical boilers.

The Dorrance shaft of the Lehigh Valley in Scranton is being extended below the Hillman vein. This shaft is one of the largest openings in the valley.

The twelve boilers—each forty feet long—which will supply power for the Kingston coal company's great No. 4 colliery, in Wyoming Valley, are being placed in position.

The new breaker for the Keystone coal company, which recently acquired a tract comprising about 600 acres of prime coal land near Mill Creek, Pa., is being erected at a rapid rate.

The patent speed and time recorder invented by C. H. Scharar, chief engineer of the Delaware and Hudson canal company, is being used at several of their collieries. It is a most valuable invention, inasmuch as it assists the operators and companies to comply with the provisions of the mine law, and fills a want that has been recognized for some time.

The Hanover coal company is cutting a tunnel through to the Ross vein from the foot of the shaft of the Maffitt colliery near Sugar Notch, Pa. This seam is also being mined from at present by a slope running into the side of the mountain, and the tunnel will open the deposits further down the side of the mountain. The coal cut from this seam is of excellent quality, free from all slate, and measures an average of 13½ feet thick.

The Beaver Brook, Pa., coal company is making extensive preparations to pump the water out of the "old shaft." Several pumps are being put in working order, and ten new boilers are being put in at No. 6, in order to furnish steam for the purpose. The shaft which is an abandoned working, was formerly owned by the Lehigh and Wilkes-Barre coal company, from whom the Beaver Brook company have leased it with the avowed intention of getting at some coal which remained unworked at its desertion.

ADVANCING WAGES.

CIRCULAR PRICES WARRANT AN INCREASE IN THE HAZLETON REGION.

The *Hazleton Sentinel* says: The cheering news comes into the Lehigh region that the circular prices now quoted at tidal points will warrant an increase in wages in October, but at this writing it is difficult to say just what the increase will amount to. This news is made the more welcome by the assurance that any further advance in circular prices will be followed by a proportionate wage increase. This information is grounded upon a reliable basis, and merchants, miners and mine employes can safely accept it as authentic.

The *Sentinel* hails the news as an evidence that the operators of the Lehigh region propose to live up to the letter of all agreements made with their employes. A wage increase was promised on certain conditions, and now that the conditions are fulfilled the increase is freely given. The business community as well as the miners may be congratulated on this beneficent result of the wage issue.

Some Railroad Points.

The poorhouse cut has been made wide enough for only a single track.

A gang of one hundred men are at work ballasting the P. S. V. road below the Seven Stars hotel.

The formal opening of the Reading and Pottsville road will not take place before the first of November.

The Pennsylvania engineers, who have been making topographical surveys from Cressona to Tremont have arrived at the latter place.

The project of running a branch road of the Pennsylvania Schuylkill Valley road to Orwigsburg, is still in abeyance.

OPPOSING THE POOLS.

The State Administration Takes a Hand in the Game—Will The Coal Kings and Railroads Heed the Warning?

A Harrisburg dispatch of Oct. 3, says: The bold movement of Governor Pattison against the coal and freight railroad pools, was not a suddenly inspired purpose. On the contrary, he has long contemplated just such a death-blow to the pooling policy of coal producers and transporters, but the opportunity has not fairly presented itself until now. The whole tendency of Governor Pattison's administration has been toward the climax he has now reached.

He took strong grounds with the granger and labor elements on the distinct issues they raised in the legislative policy of the state, and he has been steadily strengthening his policy as events developed which increased the power of the interests with which he made common cause, until now he believes that the time has come when the pool system both in the production, transportation and sale of coal and in freights on railways can be absolutely and finally broken up.

It is certain that the open letter of Governor Pattison to Attorney General Cassidy suggesting the careful consideration of the subject, is the result of the most exhaustive study of the question by those officials, rather than the initiatory step toward inquiry. In point of fact, the governor's letter is simply the public invitation to the attorney general to proceed promptly in the execution of a policy that has been fully determined upon, and there is now no doubt in the minds of either as to when, where and how proceedings shall be instituted. Their purpose has not been made public, but their action in the attempted sale of the Beech Creek and South Pennsylvania railroads may be accepted as indicating the course to be pursued.

With the decision of the supreme court broadly declaring any combination to be criminal that is prejudicial to the public or oppressive to individuals, proceedings may be instituted for criminal conspiracy, as was done in the case of the officers of the Standard oil company. The more probable plan of action, however, will be by the attorney general applying to the Dauphin court for an injunction to restrain the execution of the pooling contract, or he may proceed by writ of *quo warranto* and involve the revocation of the charters of the pooling corporations. As the present governor and attorney general have only about three months more of official power there is every reason to believe that legal action will be promptly taken and the consideration of the case pressed with determination to put the issue in such a position that any succeeding administration would be compelled to prosecute it to final judgment.

This question may not have been raised at this time as a political expedient, but it will play an important part in the pending contest regardless of the purposes of the executive. It is the first decided, practical stand taken by the authorities of the state against corporate combinations, and it is taken at a time when there is more popular interest felt in the issue than ever before in the history of the state. There has been a visible drift of the chief corporate interests of the state toward the election of Beaver and the defeat of Black, because of the pronounced views of Black in favor of the strict enforcement of the provisions of the constitution restraining undue discrimination by transportation companies, and the bold move of Governor Pattison to break up the whole pooling system in both coal and freights, will intensify the interests and efforts of both corporate power and its opponents. It will force the issue directly before the people, and there is now no reason to doubt that, whether the courts shall break up the pooling system or not, there will be direct and positive legislation against it in the early part of the next legislature. Hitherto, while corporate interests could combine in a day to defeat or elect candidates for important political offices, the vast and unorganized agricultural, mechanical, labor and commercial interests have been unable to act with any unity. Now, the issue will face every condition and class of the public, and the fact that it will crystallize corporate power against the policy of the administration will be certain to crystallize the transporters and consumers into united purpose and effort to an extent hitherto unknown in our political struggles.

The presidents of the coal-carrying railroads and coal companies forming what is now known as the anthracite coal combination, are not much disturbed so far at Governor Pattison's declaration of war and threat of an injunction restraining them from combining.

"The governor of Pennsylvania," said President Olyphant, of the Delaware and Hudson canal company, "can't understand what the anthracite combination is or he would not allow himself to make such wild statements. There is no combination. The only agreement among the coal companies is practically to mine all the coal they can possibly sell, each company agreeing on the share it shall supply to the grand total. The coal companies have, to an extent unknown in any other interest, studied the interest of the public to the detri-

ment of the owners of the properties. Coal has been selling during this year at seventy cents a ton less than the prices of 1884 and thirty to forty cents below the prices of 1885. The \$500,000,000 invested in coal properties make today hardly 2 per cent interest. Last year the total output of coal was 31,000,000 tons, while this year the agreed-out-put will be 33,500,000 tons—greater than has ever been known in the history of the coal trade."

"I am surprised that such an intelligent man as Pattison should talk that way," said President S. Sloan, of the Delaware and Lackawanna. "We are doing our best to improve the condition of the trade and pay our taxes to the state. You do not hear the people objecting to the rate of transportation. Do you hear them saying, 'The price of coal is too high'?" As to our rates as common carriers to mine coal that is for lawyers to settle. We are careful and go very slowly and do nothing we don't think we have a legal right to do."

President Hoyt, of the Pennsylvania coal company, said: "I can't understand how the governor of Pennsylvania can make a public statement so incorrect in every way. I will not admit there is a coal combination."

Three arbitrators are appointed by the combination to decide each year how much the market will take and decide upon the total output from the mines. They are President Potts, of the Susquehanna; E. P. Holden, of the Delaware and Lackawanna; and President Harris, of the Lehigh coal and navigation company, of Philadelphia. President Potts said that the threat of an injunction amounted to nothing, as the coal carriers' charters gave them the right to mine coal, and Governor Pattison should have been aware of the fact before he made such public statements.

President Roberts, of the Pennsylvania railroad, said: "The document, so far as it relates to the coal pool or anthracite combination, as the governor calls it, has no interest for the Pennsylvania railroad company. We do not and never have belonged to any such pool or combination. We have steadily and consistently refused to join the pool or to be bound by its actions. We have always refused to join any combination to restrict production. Looked at simply from a selfish point of view our interests are all in the other direction. The Pennsylvania railroad company owns the controlling interest in some coal mining companies, but our interests as miners are insignificant in comparison with our interests as carriers."

MINING IN THE WEST.

Washington Territory's Coal Lands Described—Great Deposits of Coal—The Wages Paid.

The coal mines in the vicinity of Newcastle, in Washington Territory, are owned by a very wealthy corporation. The motive power and machinery generally are under the control of an efficient superintendent. The mines have each their own supervising engineers, gentlemen widely known as experts. Still another officer has charge of the large central depot for the distribution of supplies among the various mines and for convenience of the miners. One cannot but enjoy the busy scene presented every working hour of the day at Newcastle; for instance, the hundreds of filled and emptied coal cars, solitary and unattended, crossing one another mysteriously and proceeding by means of intricate switches and graduated inclines each to its own destination or driving out of sight into the profound caverns, at whose dark mouth trains of mules seize them and hurry them from view; the series of endless chains hauling the coal up steep grades; the immense, ingenious screens for separating, the commodious receptacle whence proceed automatic feeders for grading and loading.

In 1880 from these mines were shipped 128,853 tons. Since then up to May of the present year 824,298 tons have been shipped, an average of 163,860 tons per annum. The mines have immediately available from their present sites abundant supply of coal for the market. Indeed there is scarcely any limit to the possible output. The limit is the quantity that can be sold. The entire Pacific coast market is only a trifle over a million tons. Two seams of the Newcastle alone easily supplied the wants up to 1884. A seam on the east side which had been on fire for many years has been entirely closed. It is burning all the time, but it "never will be missed." The character of the coal is a bright and coarse lignite, convenient of fracture, and well suited for domestic and manufacturing purposes. The quality obtained from the Franklin mine is said to be chemically richer than that from the Newcastle, and identical with that of the Black Diamond, first opened in April of last year, and yielding from 200 to 500 tons per day. It is also hauled by the Oregon improvement company, are the Reuton and Talbot coals. This is known as the Lake Washington field.

No mines in the northwest have been developed as thoroughly and extensively as these. The success of their management has been marked. It has also publicly been of service in clearly deflating what has been hitherto known only by rumor, the

coal regions of Washington territory. These lie west of the Cascade Mountains, and haunt the Puget Sound basin. They stretch east and south to the Chehalis valley, and north to the Skagit river and Bellingham bay, about the western terminus of the Canadian Pacific, embracing the country immediately drained by the Skagit, the Green, the Cedar and the Snoqualmie. The nearer the mountain range the coal is found, the older is its formation and the purer its quality. There are croppings of profitably productive lignites and even cretaceous coal near the junction of the White and Stuck rivers. Coal is also reported east of the Cascade range, but the large deposits are in the great southern fields known as the Puyallup, which inhabit several of Mount Tacoma's glacier streams. Here are three collieries: South Prairie, Wilkeson, and Carbonado. Tacoma is the shipping point of these mines, the northern Pacific R. R. Co. handling the product. The Wilkeson and Carbonado are mined entirely by the Pacific improvement company, for the use of the Southern Pacific railway system. They yield a bituminous and coking coal, but often soft, and pulverizing easily and belonging to the lower grade of this variety of coal. This mine and the Wilkeson contribute the main product of the district. They ship about 150,000 tons annually. One and one-half miles from South Prairie George F. Whitworth, of Seattle, geologist and Presbyterian minister, has opened a mine, for which some San Francisco parties have supplied the capital. This mine is situated on the Northern Pacific R.R., and shipped in 1885 about 35,000 tons. It is good coal, and now being developed. A late discovered and probably valuable deposit is that known as the Cedar and Green river. The coal is bituminous and of superior quality, being light and porous, free from sulphur, rich in combustible matter, and a good steam gas, or house coal. The beds are seen first in thickets, and then in the east of Lake Washington, so situated as to be easily worked. There are some thin Anthracite veins in the neighborhood. These mines have been closed down but are about to be reopened by a strong company under the control of Mr. J. M. Colman, whose name has been from the first associated with the coal history of the territory.

The number of laborers employed in the entire territorial mining industry at present aggregates about 850 men. Over one-half of this number form the villages of Newcastle and Carbonado. The latter is almost entirely an Italian settlement, Scotch, Irish and Welsh who are natural miners form the majority of the mining population. The current wage paid is: Inside mine laborers from \$2.25 to \$2.75, outside laborers from \$1.75 to \$2 mechanics from \$2.75 to \$3.50. Skilled artisans connected with the mines have been getting \$85 per month. I am informed (but cannot here verify) that the same laborer is worth about \$55 in the anthracite mines of Pennsylvania, and that men in the shaft who earn \$80 can earn about \$40 in Pennsylvania. Pumps, shovellers, rolmen, helpers, engine-men, cutters, coal-boys, wheelmen, fuelers, loaders and drivers, have made \$55 to \$60 here as compared with from \$26 to \$42 in Pennsylvania.

The future of the coal industry is dubious. The governor in his report to the secretary of the interior gives the total shipment of the territory for the year ending June 30, 1885, as 380,250 tons. I have statistics of 275,488 tons this year to June, 1886, and do not believe that the aggregate is more. The cause of the falling off of supply is lack of demand, the home consumption and San Francisco furnishing the only market. It seems that this coal should also go further south, where it is a fuel region. The coal nearest to its greatest city is certainly 800 to 1,000 miles distant. There is entire water transportation from the mines to San Blas, and when the road is complete from there to the city of Mexico, another market should be opened.

The eminent menace is foreign competition. That sea of mountains called British Columbia has vast possessions of hard coal on its ocean front. According to the colonial reports, 2,281,070 tons have been shipped during the eleven years ending with the month of December, 1884. At least two-thirds of this amount, equal to the consumption of the territory, was marketed on the Pacific coast. From Australia immense quantities of the very finest coal are cheaply brought as ballast by vessels seeking lumber and grain.

The territory's closed-down mines tell the story of their competition with these foreign coals at a duty of 75 cents per ton. Of all the mines that have been opened in the territory only those which have been heavily capitalized have survived. The Oregon and Pacific improvement companies properties produce copiously and are excellently managed. But for one and for the rest to the other the record is almost unbroken of abandonment and loss. The earliest mines opened in the territory were those in the vicinity of Bellingham Bay and Lehome, in the extreme north of Puget Sound. They were worked to a profit for some years—1860-1878—but the coal was inferior, and the work becoming difficult, one arm of the mine extending beneath the bay, the mines were abandoned. The Lehome resources are not exhausted, but it is not probable that they will be reopened. About 250,000 tons were taken out during the life of the mine; 132,923 tons were shipped during the last year of working. The mine is now full of water.

There is every indication that as great deposits of coal as those which already been found await discovery. Mr. Villard's transcontinental survey was disbanded before it had unfolded the anthracite deposits east of the mountains, but not before it had demonstrated the importance to the national government of its mineral possession in this region.

TRADE REVIEW.

THE COAL TRADE.

There is a steady and continuous increase of activity in anthracite. Convinced that the recent advances in prices are to be maintained, buyers have been stimulated into making purchases with a briskness that even the most sanguine of operators and dealers hardly looked for. Those advances were not rashly made. The managers of the anthracite interests had made a very careful examination into the condition and feeling of the several markets through their resident agents and on the basis of their investigations they knew that a reasonable advance could be made and maintained. The delay in orders during September, in the hope of a break in the combination, has helped to make October demands all the more brisk, and now there is a rush from all quarters to secure supplies, so much so that the companies say that they cannot meet the demand at present, and expect to run their mines full time this month, probably all of next month and thence on to Christmas. The carrying companies still fall short in facilities and ability to meet the calls on them for shipments. Stocks are light everywhere. The New York companies are short of the large sizes. Lehigh Valley and Lehigh and Wilkes-Barre companies have a fair supply of stove but are short of chestnut. Delaware and Hudson, the Scranton company and the Pennsylvania coal company are also short of chestnut. Reading is very short of stove but has some chestnut. The Philadelphia line and city demand is very large at the advanced prices. At Port Richmond, on the 13th, there were only 32,000 tons, and it was spoken of as impossible to increase the amount, so much being required for immediate consumption that the cars are dumped into vessels at once.

Western shipments of coal show a steady, and this year a phenomenal, increase in volume. The usual trade is only about 2,500,000 tons per annum, whereas this year the increase reaches the handsome total of 700,000 tons. The bulk of this trade is controlled by the Lackawanna and Lehigh Valley companies.

The total amount of anthracite coal sent to market for the week ending Oct. 2, as reported by the several carrying companies, was 687,555 tons, compared with 795,059 tons in the corresponding week last year, a decrease of 107,504 tons. The total amount of anthracite mined thus far in the year 1886 is 23,197,175 tons, compared with 22,405,013 tons for the same period last year, an increase of 891,562 tons. The following statements gives the gross tonnage of each of the leading coal carrying companies for the week ending Oct. 2, and for the year to same date, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R. R.	287,107	10,514,953	10,014,243	500,710
Lehigh Valley	130,110	5,254,524	4,936,047	318,477
D. L. and Western	105,372	3,651,051	3,482,287	168,764
Shanokin	16,215	622,306	731,088	108,782
Und. R. R. N. J.	41,580	1,219,365	1,250,592	31,227
Penna. Coal	34,708	1,070,432	978,275	92,156
Del. and Hudson	16,215	622,306	731,088	108,782
Pa. and N. Y.	45,408	1,498,078	1,292,066	206,012
Clearfield Pa.	14,571	1,598,024	2,160,752	562,728
Hun. and B. Top.	12,204	499,519	465,880	33,639
Nor. and Wm.	20,319	637,057	427,511	209,546

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Oct. 2 was 307,836 tons, of which 233,102 tons were coal and 74,734 tons coke. The total tonnage for the year thus far has been 11,194,209 tons, of which 8,632,502 tons were coal and 2,561,707 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending October 9, was 318,000 tons, of which 32,700 tons were sent to and 35,700 tons shipped from Port Richmond, and 33,000 tons were sent to and 31,000 tons shipped from Elizabethport.

The shipments from the mines of the Cumberland coal region for the week ending Oct. 2 were 76,492 tons, and for the year to that date 1,755,957 tons, a decrease of 323,716 tons as compared with the corresponding period of 1886.

Chicago.

From the Industrial World.

Anthracite has moved up another peg twenty-five cents per ton all around. The advance went into effect on the first of the month, and applies to both the wholesale and retail trade. The demand

is very active throughout the west and northwest, and an increase over last year's requirements is becoming more apparent every day. No one seems able to tell exactly when they will begin to receive a larger supply from the east, but the opinion is expressed that after the middle of this month there will be a more general movement of coal from the east.

Bituminous coal is moving in greater volume, and prices have been advanced slightly. It is stated that the supply on hand at the upper lake ports is far short of what will be consumed during the winter, and this deficiency will have to be supplied from this market.

Receipts of coke are heavier and stocks are in good shape. The demand is also getting better. Prices are without change.

Canal coal is moving more freely now that cooler weather has set in, and values have gone up a shade higher.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.		Per net ton by carload.
Grate	.....	\$ 25
Egg	.....	5 50
Stove	.....	5 75
No. 4	.....	1 65
Nut	.....	5 75
Lehigh Lump	.....	7 50
BITUMINOUS.		
Erie & Briarhill	.....	\$4 35
Pittsburg	.....	3 25
Indiana Block	.....	2 65
" Slack	.....	1 25
" Nut	.....	1 65
Baltimore & Ohio	.....	3 00
Hocking Valley	.....	3 00
Youghiogheny	.....	3 25
Washington	.....	2 10
Blossburg	.....	3 25
Cumberland Smelting	.....	3 25
Southern States	.....	3 80
Grape Creek	.....	2 00
Fountain County	.....	2 00
Clinton Lump	.....	2 00
Streator	.....	2 00
Minonk	.....	2 00
Morris	.....	2 00
CANNEAL.		
Kanawha	.....	4 70
Buckeye	.....	4 20
COKE.		
Connellsville Coke	.....	4 75
Crushed Coke	.....	4 75
Charcoal, carload per bu.	.....	8 1/2

Pittsburg.

From the American Manufacturer.

A number of empty craft came back on the rise of last week, but there was not enough water for the movement of loaded vessels. At this writing the Ohio has receded until it is too low for empties. There is but little change at the mines, and none whatever in prices, which remain as quoted below:

PRICES AT PITTSBURG.

River, wholesale, on board.....	3½@4½ cts. per bushel.
Railroad.....	4½@4½ cts. per bushel
AT CINCINNATI.	
River wholesale, on board.....	5½@6½ cts. per bushel.
AT LOUISVILLE.	
River, wholesale, board.....	5½@6½ cts. per bushel
AT NEW ORLEANS.	
River, wholesale, on board.....	25@26½ cts. per buhl.

Bushels are rated among dealers here at 76 lb.—26½ bushels make a ton of 2000 lbs., approximately.

The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke.—All the ovens continue in operation full time. Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed; \$2.25.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Oct. 9, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North	67,183-00	1,722,752-14
Shipped South	65,173-09	2,061,538-00
Total	132,356-09	3,784,290-14
For corresponding time last year.		
Shipped North	75,273-11	1,740,182-18
Shipped South	64,243-16	1,881,351-11
Total	139,517-07	3,621,534-29
Increase	7,182-98	162,755-85
Decrease	7,160-18	162,486-11

It is very probable that first-class anthracite coal will be placed on the market in Winnipeg, in the "Far West" of America, in a few months. The Canada anthracite coal company are pushing work energetically in their mines, known as the Cascades, Banff, and Alberta. Several car loads of the coal have been taken to be tested on the Canadian Pacific railway engines and in the workshops. The coal has been examined by several local experts, and they speak highly of its quality. In appearance it is much brighter than Pennsylvania coal, and many points of superiority are claimed for it. The tests at Winnipeg have been satisfactory, an engineer and a foreman in the railway workshops saying that they kept up steam a whole day with 750 pounds less of this coal than was required of the Pennsylvania coal. It has also been tried for domestic purposes with good results.—*Liverpool Journal of Commerce.*

LABOR MATTERS ABROAD.

The whole of the colliers in the Raubon and Wrexham colliery districts, of Scotland, stopped work on the 30th, owing to a dispute on the question of raising 21cwt. to the ton.

Four hundred men and boys employed at the Westleigh collieries, Lehigh, England, are out on strike. A dispute arose as to the rate of payment for getting coal in a newly opened pit. In the other pits of the company is 3d. for round and 1s. 01d. for bulky are the amounts paid per ton; but in the new pit the prices offered are only 1s. 1d. and 10d.

From Wolverhampton we hear that extraordinary long weights are being conceded at the collieries to encourage trade, and this makes the actual prices received for coal per imperial ton even less profitable than appears on the surface.

Geologists say that the coalfields of South Wales and Somerset are connected with those of Belgium and the north of France, and the question is at what depth and whereabouts they lie in the south-east of England. Hythe, Sandwich, and Dover are supposed to be likely spots, and the deep boring now being made at Dover is at the instance of the directors of the South-Eastern railway.

In July last a deputation from the united coal trade of the north of England waited upon the directors of the North-Eastern railway to urge the need for a substantial reduction in the cost of the carriage of coal. *The Newcastle Chronicle* now states—"We have ground for the belief that the directors of the North-Eastern railway have given full and attentive consideration to that request, but in the interests of the railway they have come to the decision to decline to grant the request of the coal-owners."

James Willis, inspector of mines, at Newcastle, Eng., has issued the following circular to the colliery managers:—"I am directed by the secretary of state to call attention to that portion of the report of the royal commission on accidents in mines which contains their observations on the relative advantages of the various kinds of safety lamps, and especially to the main condition which they lay down as essential to any safety lamp, viz., the source of light within the lamp should be unable, under any circumstances at all likely to occur in coal mines, to cause the ignition of any inflammable mixture of fire damp and air, even when this is passing in a high velocity."

GOWEN'S VIEWS.

Governor Pattison's Letter Confounds All His Ideas of Political Economy.

When President Gowen, of the Reading company, was asked by a reporter what he thought of Governor Pattison's letter to Attorney-General Cassidy in regard to railroad and coal combinations, he replied: "I cannot understand it. The governor seems to think that Pennsylvania products should not bring good prices. We mine every year about 35,000,000 tons of anthracite coal in Pennsylvania, of which three-quarters is sent to other states. The commercial prosperity of Pennsylvania depends upon her ability to find steady markets at good prices for all her products. But the governor seems to think it is better for Pennsylvania to dig out its valuable coal and give it to the other states for nothing. This confounds all my ideas of political economy. Again, there are probably 100,000 working men engaged in the coal traffic. The better the price of coal, the more they get for wages, and it is now too late to deny that good wages and prosperity go hand in hand. If the governor and the attorney-general get after these 100,000 men with their quo warrants to compel them to reduce wages, there will be a pretty kettle of fish about election time in the coal regions. I hope Lieutenant-Governor Black will be about to see that the row is not laid to his door."

Reporter. But can the attorney-general do anything to the Reading railroad company?

Mr. Gowen. You must ask him that question. But one thing appears incongruous in the whole matter.

Reporter. What is that?

Mr. Gowen. The combination this year has been under the control of the receivers, and everybody knows that the result of their combination has been to reduce prices, and their balance sheet shows it. You see, the idea of managing the trade was to restrict production and reduce prices. They have a cloud of lawyers advising them, and I suppose they had a legal opinion that combinations to advance prices were illegal. But they had heard that a combination in the coal trade was important, and so in order to be on the safe side, they determined that their combination should reduce prices, and when the attorney-general gets after them, they can prove an alibi.

THE Tacoma coke company, whose mines are at Wilkeson, Pierce county, Washington territory, after experimenting for about two years to manufacture coke out of its coal, has begun the erection of forty ovens, ten of which are to be completed at once. This is the only coke manufactured on the Pacific coast and it is said to be of excellent quality,

GENERATION OF STEAM.

Conditions That Apply and Govern in Its Making and Use as a Power.

At the present time when constant efforts are being made to secure increased economy in the use of steam power, it may not be amiss to consider briefly some of the fundamental principles governing its use, to the end that we may better know in what direction to look for improved performance.

The first step is the generation of steam. The quality of the fuel, the perfection of its combustion, and the design of the boiler and its setting are the most important factors to be considered in connection with this problem.

The quality of fuel should always be judged from the standpoint of its cost. The best fuel is that from which the most steam can be obtained for a given sum of money, and by this we mean not merely the market price of the fuel, but include all the expenses of storage, transportation, handling, etc., in fact everything going to make up the total cost of the fuel, from the time it is selected to the time the ash and refuse are finally disposed of. In the case of a very inferior grade of fuel, the extra cost and expense of maintenance of the greater number of boilers required to furnish a certain amount of steam, than would be necessary were a better grade of fuel used, should be carefully taken into consideration.

A carefully kept record of this character, which would show the exact commercial value of each kind of fuel, would prove of the greatest value.

The primary consideration governing the selection of a boiler are safety, economy, and durability. With a well-constructed boiler of almost any of the ordinary types, the first condition will be fulfilled; if the boiler is properly cared for, unless it is, safety cannot be expected under any circumstances. With any type of boiler, intelligent and painstaking care is imperative if we would reduce the risk to a minimum.

Economy is the object in boiler design and construction that has often been "shot at and missed," probably, than any other thing under the sun. Most of those who have sought this have aimed very high, but for some reason or other their shots have usually fallen far short of the target. Very few bull's eyes have been made in this sort of practice. The explanation of this may be found in the fact that about 99 in every 100 who have tried their hands at improving the steam boiler have not understood the first principles underlying economy. Hence the immense number of economies which may be seen on every hand. Expensive and complicated designs have multiplied to such an extent, and the failures have been so many, that one wonders that anybody can be found with sufficient hardihood to make another attempt. But still each day brings forth some device which its sanguine inventor fondly imagines is to revolutionize everything.

The generation of steam is accomplished by transmitting to the water in the boiler the heat liberated by the combustion of the fuel. This in itself is a very simple process, and to our mind it appears that the plainest and simplest arrangement of the heating surface of the boiler will yield absolutely the best results. The principal things to be borne in mind in designing a steam boiler are: To give a proper amount of heating surface, to place this heating surface so that it may be the most effective, and to so shape the boiler that the circulation shall be as free as possible. Due regard must also be paid to what may appropriately be called the "get-at-ability" of the whole structure for facility of cleaning and making repairs. With all due respect for some of the magnificent specimens of boiler architecture which have from time to time been erected at great expenditure of money and brain-power we feel impelled to say that in our opinion, based upon the observation of the practical working of all kinds of boilers, the best type of boiler for use on land, and the one which, entirely aside from the fact that it is the cheapest, most easily constructed, kept clean and repaired, most perfectly fulfills the above conditions, is the ordinary form of horizontal tubular boiler, when properly designed, and well built and set. It should, of course, be somewhat modified in its proportions to most perfectly adapt it to the different fuels which may be used, or quality of water which may be available. But the general form should remain the same. It should still remain a horizontal tubular boiler. We fail to see any advantage arising from setting it up and running it at the various angles of altitude which have been tried by different engineers at divers times.

The proportions of grate to heating surface should be such that a sharp fire may be kept, and yet have the resulting heat absorbed by the water. Slow combustion gives the best results only when the heating surface of the boiler is insufficient to transmit the heat to the water, when there is a sharp fire, and it passes up the chimney. This will be evident when we consider that the heat available is that due to the difference between the temperature in the furnace and that of the steam, which depends upon the pressure carried. The sharper the fire the higher its temperature, and the greater is this dif-

ference which is thus directly available. But the heating surface must be sufficient to absorb this heat and not allow it to pass up the chimney.

This ratio of grate to heating surface should never be greater than 1 to 40, and 1 to 60 is better.

After steam has been generated it should be used as quickly as possible. Storing it up in domes or drums to give it a chance to get dry, has the opposite effect. It gets wetter, by reason of condensation resulting from loss of heat by radiation, which we are unable to entirely prevent. It therefore naturally follows that we should locate boilers just as near as possible to the place where the steam is to be used, and do away with all domes and drums. The point is too obvious to require demonstration, but is often disregarded.

The same principles govern the selection of an engine that apply to the selection of a boiler; that is, let the one that will yield the best return on the money invested in it. The selection of a type of engine best adapted to a given purpose is a question that has given rise to a vast amount of discussion among engineers, and the determination of the size of an engine to yield a given power with the greatest absolute economy has been a fruitful theme of discussion among theorists. Many and complex are the formulae that have been devised to determine the best ratio of expansion, which in its turn would fix the size of the cylinder to give the very best results. In our opinion the discussion of this question from a theoretical standpoint, is a very pretty exercise of mathematical ability which don't amount to so much as a row of pins, practically. All such formulae must necessarily start from the basis of a constant load, and to the best of our knowledge (and it covers a period of quite a number of years) this is a condition that is never fulfilled. The most that can be done is to fix the size of the engine so that with ordinary pressures, say from 75 to 100 pounds per square inch, the point of cut-off shall not, with ordinary variations of load, be much shorter than one-fifth of the stroke, nor more than one-third of the stroke. Between these points an ordinary unjacketed simple engine, whether condensing or non-condensing, gives its best, and at the same time practically the same economical results. Due allowance must also be made in putting in an engine, if an increase of business, and, consequently, of the load to be driven, is likely to follow. These are things that no mathematical formulae can deal with, and must be left entirely to the judgment of the persons most interested. People who are thoroughly conversant with the details of their business, are better judges of this question than are the most expert mathematicians, and it can safely be left to their judgment.

The question of whether a high-grade automatic cut-off, or plain slide valve engine should be used for any given purpose, has also caused much more discussion, and a greater waste of printer's ink than is at all necessary. In our opinion, no man who has to buy fuel of any kind can afford to run a slide valve engine of more than ten horse power for stationary purposes. The performance of the better class of engine is so far ahead of the other that there is no chance for discussion on this point.—H. F. S. in the Locomotive.

Utilization of Ozocerite.

Ozocerite is a mineral wax or native paraffine, rather scarce and found only in few localities. It usually occurs in beds of coal or associated bituminous substances. It is like wax or spermaceti in appearance and consistency, ranging in color from an impure white to black, but is frequently brown or green. Some years since a deposit of this substance was discovered in southern Utah—the only place in this country, as far as we know, where it has been found. It was considered so valuable that a Boston company was formed to work the deposits, which has since been mined extensively and to some purpose. Samples analyzed were found to contain a large percentage of white wax of the kind used in making paraffine candles. A new and important application of ozocerite has been recently discovered in Russia. It is now used for making ties on the Transcaspian railroad, which has already passed Oschan and nearly reached Merv. The process of manufacture is very simple and inexpensive. Kyra, the local name for ozocerite, is found there in thin layers of seven-inch thickness. In its primitive state it contains a certain percentage of decayed matter. To remove this, the ozocerite is melted in large chaldrons, the refuse sinks to the bottom and the pure ozocerite collects at the top. This purified ozocerite, melted and mixed with 75 per cent. of limestone and 25 per cent. of fine gravel, gives a very good asphalt, which is pressed in boxes shaped like railroad ties. Notwithstanding the high temperature, which reaches 140° F., the ties retain their shape and hardness. These asphalt ties are used all along the road, except at the ends and center of every rail, where, as yet, wooden ties are employed. In this way about \$500 a mile is economized.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always* when you fail to receive a copy of their paper in due time, that they notify the office by postal card or letter, and we will, if possible, recall all missing numbers.

COKE.

Rank of the Producing States and the Amount They Yield.

Although a good many thousand tons of coke are used on this coast every year, for smelting and foundry purposes, there is none manufactured here, aside from the small quantities from various local gas works. The coke used is imported from abroad, and arrives in the vessels which come for the wheat crop. Neither California, Oregon, Nevada, Utah, Arizona or Idaho produce any at all. New Mexico, Montana and Washington turn out a small amount, but compared with eastern states the quantity is insignificant. Mr. Weeks, of the U. S. geological survey, who compiled the statistics of last year, gives the following figures of production of coke in the United States in '85: Alabama, 301,180 short tons; Colorado, 131,960; Georgia, 70,669; Illinois, 10,350; Indian Territory, 3,584; Kansas, 8,050; Kentucky, 2,804; Montana, 175; New Mexico, 17,940; Ohio, 39,416; Pennsylvania, 3,991,805; Tennessee, 218,842; Virginia, 49,139; Washington, 311; West Virginia, 200,571. Total, 5,106,696.

In the rank of coke-producing states, Pennsylvania still stands first, with Alabama second, West Virginia third, and Tennessee fourth. These four states hold the same rank as in '84. The largest coke-producing locality in the country is the Connellsville region of Pennsylvania, in which was made 3,096,012 of the 5,106,696 tons, or 60 2/3 per cent. of the coke produced in the United States in '85. The second largest producing district is what is called the Irwin-Latrobe, which lies along the Pennsylvania railroad, from Larimer to Blairsville, and is, in part, the northerly extension of the Connellsville coking field.

The statistics of coke in this country in '85 are as follows: Number of establishments, 238; ovens built, 20,116; ovens building 432; coal used, 8,071,126 short tons; coke produced, 5,106,696; total value of coke at ovens, \$7,629,118; value of coke at ovens, \$1.49 per ton; yield of coal in coke, 63 per cent.

The number of establishments has slightly decreased. Part of this decrease is due to the consolidation of establishments, but chiefly to the abandonment of works of but little importance. The number of ovens in 1885 was 20,116, as compared with 19,557 in 1884, an increase of 559, 2.8 per cent. There were, however, only about one-half the number of ovens building at the close of 1885 that there was at the close of 1884. While the production in 1885 has increased over that of 1884, it is not as great as in 1883, the production in 1885 being 5,106,696 tons as compared with 4,573,805 tons in 1884, and 5,464,721 tons in '83. There was no increase in the value per ton of this coke in '85 over '84 nor has there been for three years. There was, however, an increase in the total value in '85 over '84, owing to the larger amount of the coke produced in the former year. The yield of coal in coke has also increased somewhat during the past year, it standing at 63 per cent. in '85 as against 61 per cent. in '84. The yield in '83, however, was given as 64 per cent., the largest average yield of coal given, the yield for '80, '81 and '82 being but 63 per cent.

A Grand Consolidation.

The New Orleans Times refers at some length to the consolidation of the Pratt coal and iron company and Alice furnace company and the Linn iron works, all of Birmingham, with the Tennessee coal, iron and railway company. It says: "The name of the last named corporation is to be retained, and will cover all future operations of the consolidation. The matter would seem to aggregate a very neat little piece of industrial property. The news of this latest Birmingham deal has created more than a little stir in the iron and steel circles at the east, coming as it does close upon the heels of the announcement that the Pratt company had perfected arrangements to go into basic Bessemer steel production on a large scale. Interest is increased, too, by the suspicion that our Alabama mineral district is to be further promoted by the speedy consummation of several plans involving developments almost as important as those intended by the Tennessee coal, iron and railway company."

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REVERSING LONG-STANDING LAW.

Riparian Ownership Receives a Setback in Its Claims for Damages.

The case of the Pennsylvania coal company, plaintiffs in error, against J. Gardner Sanderson and Eliza, his wife, in right of the wife, defendants in error, has been finally decided by the supreme court, of this state in an opinion given last week, by the reversal of two previous decisions, in a decision for the coal company. The case is of the utmost importance to mining operators, oil operators and all others doing business on the banks of natural water courses, and as well as to all owners of riparian property.

The history of the case may be thus briefly stated: In mining anthracite coal it is necessary to keep the mines clear of water, which accumulates in large quantities and which must be removed either by gravity or powerful engines and pumps, and must find its escape through the natural water courses. This water is acidulated with sulphuric acid and consequently is destructive to iron pipes, kills fish and cattle refuse to drink it. The Pennsylvania coal company owns a large colliery in Scranton called the "Gypsy Grove Work" and the water from this mine is pumped and discharged into a small stream called Meadow Brook, a tributary of the Lackawanna river. In 1868, J. Gardner Sanderson built a handsome residence on Meadow Brook, below the colliery, on which he made a fish pond and provided machinery to force the water of the brook into tanks in his house for domestic use. As the operators of the colliery grew and the discharge of the mine water increased, the water of the brook became so contaminated as to destroy Mr. Sanderson's pipes, kill his fish, and, indeed, become totally unfit for use. He then sued the company for damages.

In 1878 the case first went to the supreme court, and the company was then held liable. Twice since it has been before the supreme court and the same decision was affirmed. In February last it again came up from the lower court, and this time the supreme court has reversed its former action and given judgment against the Sandersons, and the matter is finally settled.

Inasmuch as numberless suits had been brought in the state under the former decisions, by riparian owners against mining operations in the anthracite and bituminous coal regions, it became of the utmost importance to the entire mining interests of the state that these decisions should be reversed if possible.

The argument for the mining company was prepared with great care by ex-Governor Henry M. Hoyt and J. A. W. C. Gest, and the following four legal propositions were laid down:

First—The question is one of vast importance and has never been thoroughly examined and never before decided.

Second—The true theory of negligence is that damages resulting to another from the natural and lawful use of his land by the owner thereof are, in the absence of malice or negligence, a wrong without violation of the law.

Third—In order to permit the development of natural resources and free prosecution of a lawful business trifling inconveniences must sometimes give way to necessities. The only question here is which constitutes a nuisance, in the water course is the prosecution of a lawful business.

Fourth—The mining industry has its particular usage and customs dictated not only by convenience, but by necessity, and are a part of the very law of nature, and the private interests of the individual must defer to them.

In the decision the court says:

"If damages may from time to time be recovered, either in the present form or as for a nuisance, punitive sums may be resorted to to prevent repetition or to compel the abatement of the nuisance; indeed, if right to damages in such cases is admitted, equity may, and under the decisions of this court undoubtedly would, at the suit of any riparian owner, take jurisdiction and upon the ground of a continuous and irreparable injury enjoin the operation of the mine altogether. * * * The defendants have done nothing to change the water or diminish its purity, save what results from the natural use of their own property. The water as it is poured into Meadow Brook is the water which the mine naturally discharges; its impurity arises from natural, not artificial, causes. The mine can not of course, be operated elsewhere than where the coal is naturally found, and the discharge is a necessary incident to the mining of it. The right to mine coal is a nuisance in itself; it is a right incident to the ownership of coal property and the owner cannot be held for permitting the natural flow of mine water over his own land, into the watercourse. * * * The defendants were engaged in a perfectly lawful business in which they had made large expenditures, and in which the entire interests of the community were concerned; they were at liberty to carry on that business in the ordinary way, and were not, while so doing, accountable for consequences which they could not control."

Chief Justice Mercer and Justices Gordon and Trunkey dissented.

THE SUPREME COURT AGAINST POOLS.

Combinations to Govern the Market Declared Illegal, Null and Void—Making "Corners" a Misdemeanor.

The instructions of Governor Pattison to Attorney-General Cassidy to take such steps as he deems fit to destroy the great coal pool entered into for the raising of prices by the leading carrying and mining companies, are grounded on the decision of the supreme court of this state in the case of Morris Run Coal Co. vs. Barclay Coal Co., to be found in the Pennsylvania state reports, pp. 173-189, for the year '71. The decision, though rendered fifteen years ago, still stands as an expression of the law of the commonwealth as interpreted by its highest court. The facts in the case then decided and the legal principles involved present a remarkable likeness to those now in issue.

A combination of five companies was formed to control the sale and fix the price of the bituminous coal production in northern Pennsylvania. The companies forming the combination represented almost the entire bituminous coal region in that part of the state. They had the power to control the market in the state of New York and to affect the market elsewhere. A dispute arose between two members of the pool as to their respective shares of sales and profits. The pooling arrangement was made in New York and was to be carried out in this state, the chief market being at Philadelphia. The parties were within the jurisdiction of the courts of Pennsylvania, where the coal was mined, and the suit was brought here. On one side it was contended that the combination was against public policy and therefore illegal. On the other it was claimed that its purpose was to lessen expense, to advance the quality of the coal, and to market it in the best order to the consumer.

The supreme court of Pennsylvania decided that the combination was a criminal conspiracy under the law of New York, which makes it a misdemeanor for two or more persons to conspire "to commit any act injurious to trade or commerce," and also a criminal conspiracy by the common law in Pennsylvania. Here is what the court said of the character and nature of the combination:

"The important fact is that these companies control this immense coal field; that it is the great source of supply of bituminous coal to the state of New York and large territories westward; that by this contract they control the price of coal in this extensive market and make it bring sums it would not command if left to the natural laws of trade; that it concerns an article of prime necessity for many uses; that its operation is general in this large region and affects all who use coal as a fuel, and this is accomplished by a combination of all the companies engaged in this branch of business in the large region where they operate. The combination is wide in scope, general in its influence and injurious in effects. These being its features, the contract is against public policy, illegal, and therefore void."

The court then cited numerous authorities to show that a combination to create a "corner" in a necessary article of life and to advance its price to the consumer is a conspiracy punishable by law, and proceeded as follows:

"The restrictions laid upon the production and price of coal cannot be sanctioned as reasonable in view of their intimate relation to the public interests. The field of operation is too wide and the influence too general."

Singly each member of the combination might have suspended deliveries and sales of coal to suit his own interests and might have raised the price, even though this might have been detrimental to the public interest. There is a certain freedom which must be allowed to every one in the management of his own affairs. When competition is left free, individual error or folly will generally find a correction in the conduct of others.

"But here is a combination of all the companies operating in the Blossburg and Barclay mining regions and controlling their entire productions. They have combined together to govern the supply and the price of coal in all the markets from the Hudson to the Mississippi river and from Pennsylvania to the lakes. This combination has a power in its confederated form which no individual action can confer. The public interest must succumb to it, for it has left no competitor free to correct its baneful influence."

"When the supply of coal is suspended the demand for it becomes importunate, and prices must rise. Or if the supply goes forward the prices fixed by the confederates must accompany it. The domestic hearth, the furnace of the ironmaster and the fires of the manufacturer all feel the restraint, while the many dependent hands are paralyzed and hungry mouths are stinted. The influence of a lack of supply or a rise in the price of an article of such prime necessity cannot be measured. It permeates the entire mass of the community, and leaves few of its members untouched by its withering blight. Such a combination is more than a contract. It is an offence."

WILL READING BE SOLD.

The Decree of Foreclosure Filed in the Robinson Suit—A Probable Order of Sale.

Richard C. Dale, Esq., appeared in the United States circuit court on the 7th and presented to Justice Bradley and Judge Butler a proposed decree in the Robinson suit against the Philadelphia and Reading railroad company for foreclosure of the property under the general mortgage.

The decree, as drafted by counsel, was read to the court, but no order was made upon it at that time. The judges took the paper and on Friday morning entered a formal decree and order based upon its suggestions. The substance of Mr. Dale's proposed decree is that the court shall find that the holders of more than one-tenth in amount of the bonds issued under the general mortgage, now outstanding, have, in writing, requested the Fidelity company, as trustee, to enter upon the mortgage property and sell it in accordance with the provisions of said mortgage, and take such steps in fact and law as may be required for the purpose of enforcing the rights of the general mortgage bondholders, and that notwithstanding the request so made the trustees did decline to regard it, and did not enter upon or take possession of the mortgaged premises. Further the court is to find that the plaintiff is entitled to a decree, in accordance with the provisions of the mortgage, and for the purpose of ascertaining the amount of bonds and coupons outstanding which are entitled to the security of the general mortgage, the appointment of a master to ascertain and report the amount due the outstanding bonds, principal and interest, which are entitled to the security, is asked for. It is also desired that the master, when appointed, will report what liens are prior to the bonds secured by the general mortgage, and to define the lien of the general mortgage upon the railroad, its branches, leasehold interests, franchises, and other property, including the property acquired since the execution of the general mortgage.

Mr. Gowen was not in court when the document was read, but none of the counsel present made any objection to its form.

George M. Dallas and James Pollock, Esqs., are by the decree appointed masters, with instructions to report within ninety days. Among their duties will be to pass on the question raised by Silas W. Peit, counsel for the income bondholders, as to the lien of the \$5,000,000 of 7 per cent general mortgage bonds, issued, as he contends, as collateral on an original lien of his clients. No question has been raised as to the general mortgage bonds. Another point for the masters to settle is the question raised by the general mortgage bond committee relative to the floating debt. Messrs. Gowen, Borie and Foster were examined at the recent hearing to prove the facts regarding the issue of scrip. The general mortgage bond committee claimed that the debt has lost its lien and should rank as an ordinary obligation of the company.

The decree rendered by the court is in pursuance of Article 9 of the general mortgage agreement, and it is stated that Mr. Gowen told Justice Bradley that with the aid of a London solicitor every effort was made to word the article in such a way that foreclosure in courts might be prevented.

BELTS receive unnecessary wear when run crossed, to give reverse motion. If cross belts could be avoided altogether it would result in a great saving in the belt bill. The inner surfaces of crossed belts invariably rub together; with how much of pressure and wearing velocity can be appreciated only by the experiment of placing the hand between the two sides of the running belt at the point of crossing. It must be a tough human skin that can resist the abrasion without showing signs of painful wear immediately. The actual wear of the material of a crossed belt at its point of contact can be seen in progress by suspending a tray, or clean board, sheet of stiff paper under the crossing; leather fluff will be deposited in sufficient quantity to convince the incredulous. The remedy for the wear of crossed belts—if crossing a belt is unavoidable—is to fix a small roll in a frame at the crossing, at the angle of the inclined belts. This will serve as an idler for the belt both ways, and will keep the surfaces separated.—*Milling Engineer.*

Naphthalene, as a wood preservative, is now largely used in that capacity in Scotland, its action being to destroy all aluminoid compounds in the wood, leaving it dry and clean to handle, and with only faint aromatic smell. The naphthalene is melted in a vessel capable of being tightly sealed, and the wood is laid in it until experience shows that the saturation is complete. The temperature at which timber is treated is kept as low as possible, so as not to injure the fiber.

In climates having a difference of 70 degrees in temperature between the hot and cold seasons, a railway track of 400 miles is 338 yards longer in summer than in winter. Of course the length of road remains the same, but expansion forces the metal closer together, making an aggregate closing up of space between the rails of nearly a yard in each mile.



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FOR THE WEEK ENDING

SATURDAY, OCTOBER 16, 1886.

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BUSINESS PROSPECTS.

No important changes in the condition of general business have been developed during the past week. Trade and industry are reported unusually active throughout the country, and a growing confidence in the stability of business is generally shared. The volume of trade is unusually large and tends constantly to increase, and at no time in recent years has the industrial outlook been as promising as at present. The volume of business being transacted is fully 25 per cent. greater than at the same period last year, and there is a hum of general industrial activity such as gives hope and encouragement to the belief that a period of unusual business activity has dawned upon the country.

The only disturbances of the industrial situation are the strike and lockout of the textile operatives at Philadelphia, and the strike of the pork-packing employes at Chicago against the re-inforcement of the ten-hour day. In the former instance concessions have been made by both parties to the difficulty, and an amicable settlement of the trouble is likely to be reached. In the case of the pork-packers' strike 16,000 men are thrown out of employment. A member of the executive board of the Knights of Labor has been sent on from Richmond to endeavor to effect a settlement of the difficulty, but at this writing very little progress in that direction has been made. The owners of the packing establishments have declared that they have no organization, and the committee is compelled to confer with each firm and individual separately. The probabilities are that the matter will be adjusted, as all such difficulties are settled—by the men either returning to work ten hours a day or by accepting eight hours pay for eight hours work.

The paradoxical feature of the business situation is the large number of failures occurring simultaneously with a largely increased and increasing volume of trade. During the first nine months of the year there was a steady falling off in the number of commercial failures, amounting to about 12 per cent. as compared with a like period of '85, but since the first of October the failures are more frequent than during the same period of last year. The total number of failures in the United States reported last week was 201, against 205 the previous week and 179 during the same week in '85, 218 in '84, and 166 in '83. The total failures in the United States this year to date is 7749, against 8684 last year, a decline of 935; 8274 in 1884, 7428 in 1883 and 5110 in 1882.

Railroad stocks continue strong, with a tendency to advance in price on assurances that the northwestern traffic pool has been perfected, and on the strength of the fact that all the roads are doing an exceptionally good business. Especial importance attaches to this agreement for the reason that it covers the most important trade west of Chicago, and for the further reason that it is generally understood the smaller pools will fall into line after the Northwestern. There are no new developments in connection with the Reading affairs, except that Mr. Gowen's plan of reorganization will be submitted in a day or two, when the question of whether or not the road will be sold under foreclosure will be determined. There is a general feeling, however, that no matter in what way a settlement of Reading's difficulties shall be reached no serious trouble to general business or to the business of the road will ensue.

The iron trade continues unusually active with a constantly increasing demand which the furnaces so promptly supply that no important or general advance in prices has yet been realized. Manufacturers, however, are not over anxious about orders, and accept them somewhat reluctantly, feeling confident that better prices will rule in the near future. Orders for steel rails are piling up, and makers have in some instances refused orders for spring delivery at ruling rates.

All the anthracite coal producers report an active demand, and the supply on hand is so short that there is an intimation that the allotment for this month will be increased. There is a rumor also that prices will be advanced again today, (Friday, 15). It is questionable, however, whether anything further than a realization of present prices would result from this advance, as the figures now obtained are from ten to twenty cents below circular rates. It has long been a very difficult matter to obtain circular prices for anthracite, whether it be two or four dollars per ton. The producers have fallen into the habit of selling at a certain figure

below the circular, and find it difficult under even the most favorable circumstances to abandon the habit. A scarcity of transportation facilities curtails the production somewhat at present, and a scarcity of water for steam purposes has compelled temporary suspensions at a few of the collieries in the anthracite region. Fears of a strike among the miners have vanished, and no trouble is anticipated from that source, at least, until the close of the season. Governor Pattison's political pronouncements against the coal combination has created a good deal of idle talk among the newspapers and the uninformed public, but has excited only derision among those who know the motives which prompted it and are acquainted with the nature and workings of the combination. As to the alleged high price of anthracite nothing could be more foolish. The result this year so far has been about 70 cents a ton less than for the same period two years ago, and thirty to forty cents a ton less than last year. And in regard to production the output this year is greater than ever before.

Bituminous coal is in much the same condition as anthracite; plenty of business doing, but no profit in it, simply because the facilities for production are equal to the greatest demand. The difference in price of anthracite steam sizes and soft coal used for a like purpose is one of the remarkable features at present prevailing, which if it proves anything, proves that anthracite is highly preferable to the softer fuel for this purpose.

FOR clean, neat typography, and warm, earnest and eloquent advocacy of southern institutions especially those looking to its business and industrial advancement, *The New South*, of Birmingham, Ala., stands pre-eminent among southern periodicals. And it is championing a great cause. In the march of progress the south of today is making giant strides, holding forth a promise of keen, sharp rivalry with the north. Her mineral resources are being developed and her manufacturing institutions established as though by a magic wand, and he who a decade of years ago traversed her territory would be surprised to see and note how the waste places have been built up and repaired, and the wilderness made to glow and blossom with the fiery flowers of the furnace and the mill, and the once sylvan solitudes to resound with the whirl, rattle and clang of the artisan's machinery. The new south is in the race for commercial and industrial standing and aiming for no second place.

AN AMUSING story as to how smart and avaricious people sometimes over-reach themselves comes from Springfield, Illinois. Contracts for supplying coal to the state-house were to be given out last week. The local coal companies combined, putting in a bid of \$2.25 per ton for soft coal; an outsider made an offer of \$2.35. Some mischievous fellow told a representative of the coal pool that it had been underbid. Late in the night before the day of the letting of the contract the coal people withdrew their bid of \$2.25 and filed one of \$1.65 per ton. They received the contract, as, indeed, they would have done, as their first bid was the lowest on file. They have beaten themselves out of 60 cents per ton on all the coal used in the state-house for the ensuing two years, and this difference amounts to a very large sum.

A WRITER in the *Revue Scientifique* affirms that, from a comparison of animal and steam power, the former is the cheaper power in France, whatever may be the case in other countries. In the conversion of chemical to mechanical energy, 90 per cent. is lost in the machine, against 68 in the animal. M. Sanson, the writer above referred to, finds that the steam horse-power, contrary to what is generally believed, is often materially exceeded by the horse. The cost of traction on the Mount Parnasse-Bastille line of railway he found to be for each car, daily, 57 francs, while the same work done by the horse cost only 47 francs, and he believes that for moderate powers the conversion of chemical into mechanical energy is more economically effected through animals than through steam engines.

THOSE interested in the wonderful application of natural gas in the region around Pittsburgh claim that the supply is inexhaustible, and that wells which began spouting gas twenty-five years ago show no abatement. The area extends over some portions of western Pennsylvania, of West Virginia, and of Ohio and Kentucky. It is said there are

hundreds of thousands of acres of excellent "gas territory" in western Pennsylvania still untouched. The theory is that the gas is forming in the earth constantly. The daily consumption of the wells at Pittsburgh is 357,000,000 feet, supplying the factories and ten thousand houses and taking the place of 4,000,000 tons of coal a year.

The first sign of dissolution of the labor canvass in New York is the offer of the George men to unite with Tammany hall upon a common ticket, of which Mr. George shall be the common head. If the scheme should be consummated, the George canvass will be no more value, considered as a labor movement, than any of the other labor movements which hitherto have always faded into significance at the polls.

A WARRANT for \$45,000 has been issued to the assignees of John Roach, in final payment for the "Dolphin," and for the care of the monitor "Puritan." This is accepted in settlement of all claims of John Roach against the government, and the "Dolphin" becomes in law what she long has been in fact, the property of the government.

THE UNPROFITABLENESS of the anthracite trade is said to be causing a number of prominent operators of the Shamokin region to withdraw. They are now seeking to invest their capital in the soft coal district in West Virginia. Two or three leases of large tracts were made this week.

MOST of those prominent in coal operations deservedly ridicule and condemn Gov. Pattison's opposition to the coal pool, as in no way beneficial to the general public while the outcome of its logic, if carried into effect, would be the ruin of private operations in a short time.

MR. POWDERLY'S salary, it is said, is to be raised to \$5,000. Five thousand dollars a year is about \$14 a day, so that it would take the laboring man fourteen days at a dollar a day to pay Mr. Powderly's salary. A Knight of Labor and his money are easily parted.

HAYES' SQUIBS.

Their Merits Call for Another Factory to Supply the Demand.

The one great desideratum in the perilous life of a miner is a safe and reliable fuse or squib for the setting off of his blasts. Of all the mine casualties of the coal region, the greatest percentage and usually the most fatal are those which flow from premature blasts, or the "hanging fire" of a squib in a charged hole. Various patents have been taken out for the manufacture of a squib that could be depended on at all times to do its work with safety to the collier, but only in rare instances have they stood the test. Changes of weather, atmospheric influence, mine dampness or dryness, with various other causes, have acted on them to their detriment and the users have suffered. One exception to the rule has been the "Hayes squib," manufactured by George Hayes at Girardville. It is the outcome of a practical miner's careful study and most exacting experiments, resulting in the production of an article that comes as near perfection as it is possible to do. It has been received with so much favor that for months past the manufacturer's resources have been overtaxed to supply the demand. Mr. Hayes gives his own personal supervision to the making of the squibs, and to this fact is due the measure of reliability they have gained. So long as he is able to do this he fears no failure in their service. In his Girardville factory a large number of workers are employed, yet they cannot keep up with the market calls. To remedy this Mr. Hayes is about to open a branch factory at St. Clair, fitting it out in every respect co-equal with his present place, and guaranteeing the same excellence in its products. The success he has gained in his business has been well earned by Mr. Hayes and the HERALD congratulates him on its enjoyment.

MINE ACCIDENTS.

A fatal accident occurred at shaft 14 of the Pennsylvania Coal Co. at Pittston, Pa., on the 6th, Fred L. Weisager of Hamtown being struck by a fall of rock.

By a premature explosion of a blast at Glendower colliery, near Minersville, Pa., on the 18th, Philip Mohan was instantly killed and two miners, named Nash and McCurdy, were badly injured.

Operator Lakin, with his three sons, were smothered in their colliery at Newbolt, Leicester, England, on the 8th instant.

A young man named Glover was killed at Kohlenoor colliery, Shenandoah, Pa., on the 14th.

HONDURAS MINING COMP'YS

The Honduras Mining Company, — J. P. Imboden, Supt. — Honduras, C. A., Sept. 1, 1886.

The following report by General Manager Imboden, covering the work done at the mines up to Sept. 1, 1886, is published for the information of the stockholders:

YUSCARAN, HONDURAS, C. A., Sept. 1, 1886.
The Honduras Mining Company, 140 Nassau Street New York: GENTLEMEN: I am glad to report the "Little Giant" doing fine work, and giving to us much fine milling ores. I am packing it up, and it will be ready for milling at any time. We are just entering the part of old works where I supposed we would get good ores, and we are not disappointed, as we find hundreds of tons of \$25 to \$75 ores, and some ore is quite rich. We will get thousands of tons of ores ranging within these figures, and what we need will be a plant to stamp and concentrate directly on the ground all ores that will not assay \$40 per ton. This will give the reduction company as much as they can do to treat better ores and concentrates. We should have a five or ten stamp mill directly at our shaft, with a common tram-way round to the hydraulic works and put cars directly into the mill both from the shaft and other parts of the mine. There is, no doubt, that this is the policy; not to interfere with contract with the reduction company, but to give them a better class of ore, and also enable us to work up ores that would not pay to have them treated by the Paraiso company. For instance, we could concentrate \$15 ores and make large returns. The concentrates would be quite valuable. I believe we could count upon fifty tons reducing to one ton of concentrates. Supposing we saved \$10 from \$15 rock, or even \$7.50 on our concentrators, and we find concentrates of several hundred dollar value. Well, we have innumerable quantities of ores that we have never counted upon as worth handling, which by this method would give magnificent returns. The better ores we would select as now, and the reduction company would treat them in gross. The work of mining was very much retarded during August by the revolutionary efforts of Delgado and his following to gain a footing in Honduras. The government took the mules we had been contracting for to haul ore. The men were opposed to the army and deserted to the woods, but we got the machinery going well and cleared the shaft of water and have been doing mining work and extracting some good ores. I think we will have our levels into the veins this next two weeks, and supply the reduction company with all the ore they can treat. Their work now is on our ores, but not the best ore. What they are treating is \$50 to \$100. As soon as we advance a few feet farther we will start up to the richer ores cut through when Mr. Foster was here. If arrangements are not made for dynamite it should be done at once. Mr. Kerns of the Platero company tells me he had, or was to have, two tons of dynamite sent him from San Francisco, and supposes it will come. The American supply company may give you the information in regard to it.

I would say, that if it is decided to put up concentration works at the mine, that we should have 25 Horse Power to drive it well, say ten stamps and concentrators, &c. This power should be an addition to our present shaft plant, and connected with the same power, say the power of steam so that we could shift all the work in dry season on to the steam, and in wet season drive it all by water. I hope by the 20th to send you through the reduction company a nice credit on account of bullion. We will keep them supplied with ores. The rains are fearful, I am told worse than for twenty years. The roads are very bad, and our shaft makes some water but not very much, so that the little sinking pump can keep it all out with ease, and we will never have much water to contend with.

The Leffel people did a poor job on our wheel. The great pressure of 300 to 600 feet is a great weight to stand. The buckets of the wheel were merely soft soldered in place, and with a full head on we broke up both wheels, the buckets flying out like shot from a gun. This would not have been the case if the wheel was cast solid and of gun metal. We have repaired the break and have the wheel going again, having made a stronger job than the manufacturer did. The solder was so soft that it could be cut like cheese with a knife. Please order two new wheels from Leffel. We should not pay for but one, but it is no use their sending simply a duplicate of the wheels here, for if they do we will have to make them over again. Get a wheel of gun metal, cast solid. A little later we will get a "Pelton" wheel. It is the best wheel in the world, and the wheel we need in this country. Water-power can always be counted on for eight to nine months for full power, and even if we have to use steam the saving for the months with water is very great.

I inclose you copy of telegrams received from General Bogram, president, which shows how this government feels towards us, and whether the work

done here has been done with business aims, and whether it deserves censure from cowards, who write articles and who are afraid to father their writings. We have done good work, honestly tried to do our best, and this government will endorse me in my actions, and endorse the company for all they have done. Would this be so if we were doing a fraudulent business. Would we receive the endorsement of all the good people if our plans were such as liars would have you believe. The question of hydraulics as attacked by the cowardly writer of those articles shows him to have been a man wholly without principle and devoid of soul or semblance to man. The Giant is doing good work, there is not a foot of granite rock on our property, or within five miles of us, but the entire formation of the hill, where our hydraulics are working, is a soft sand and slate formation, easily broken and cut by our water, and not an inch needing the power of powder or sledge. We have already gotten out more ore than would pay for the entire outlay, and we are just getting into where we expected to reap reward; we can get out more ore with the Giant than a ten stamp mill will crush. I merely mention this portion of that dirty article to show its full character, and the character of its writer. All his other points are in harmony with this, and no doubt he now revels in good and lasting drunks from the "blood money" he received for his scribbling.

The "reputed" mines he mentioned are the solid mines of Honduras. They have produced more returns in the past in proportion to area than any other mines in Central America, and they stand today as real monuments of the great wealth of these old hills. The writer of that article had an "ax" of his own to grind and did not have sense enough to know that he could cut his own foot with it. You will find him, and when you do, you will see that he was paid to say the lies he wrote.

A cable from Captain Imboden, dated September 29th, states that "he has opened a vein in the Hydraulic work, 20 inches in thickness, and the average assay of which is \$50.00 in silver and \$25.00 in gold."

DOINGS IN COAL.

The Johnson coal operation in the Flowery field tract, near Wadesville, Schuylkill county, Pa., is progressing quite favorably.

Three hundred employees struck at Peerless colliery, Shamokin, Pa., because the operators could not prepare coal quickly enough to give them cars. There are some queer causes of strikes.

A six feet seam of coal was struck at the Neilson shaft, Shamokin, Pa., last week. The men have struck another seam and are working through it now. Its thickness is not yet known.

Anthracite coal dust is to be made into coal bricks for fuel to be used in locomotives, glass furnaces, steamers and for domestic purposes. A company has been formed with a capital of \$75,000, and it expects to go to work on a large scale right away.

H. G. Fisher has bought 1,624 acres of coal land on the north side of Mahoning creek, Jefferson county, Pa., paying for it \$97,275. Capitalists in New York and Philadelphia are interested in the enterprise, and it is intended to make Punxsutawney the centre of a vast coke industry. They will begin operations as soon as they can get the works opened and a road built from Meshaffey, the present terminus of the Bell's Gap railroad, to Punxsutawney, a distance of nineteen miles.

All Danbury, Connecticut, is excited over the discovery of coal on the farm of Edward Stevens, in the Middle River District. In excavating for an artesian well a dynamite cartridge was exploded and several fine specimens of coal were discovered. On following up the excavation a distinct seam of coal was found. Further excavations are to be made at once to ascertain if coal may be found in sufficient quantities to warrant working the seam. Mr. Stevens has already refused an offer of \$5,000 for the privilege of working the seam.

LABOR TOPICS.

The system of public lectures by Knights of Labor will be carried on energetically during the coming winter. The best speakers will be engaged and special efforts will be made to furnish them with the most valuable information that can be had.

It is safe to say that no class of workmen incur more danger than miners. The death roll for 1885 by accidents in Pennsylvania coal mines foots up 394. Of these 311 were killed in the anthracite district and 83 in the bituminous. The non-fatal accidents numbered about three times the fatal ones, many of the victims being maimed and crippled for life.

Says the Philadelphia Ledger of Oct. 9th: The recent advance of fifty cents a ton in the price of coal has its compensating advantages. The miners "share" in the increase. According to one calculation the Hazleton miners get three cents out of the fifty.

There are estimated to be 195,493 square miles of coalbed in the United States. In 1882 the total yield of the mines was about 86,900,000 tons.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Working Out a Formula.

Editor Mining Herald and Colliery Engineer:

SIR:—In E. B. Wilson's book on "Mine Ventilation" question 13, on page 125, reads as follows:

There are 50,000 cubic feet of air passing, having a rubbing surface of 24,000 feet, and an area of 20 square feet; what is the water-gauge?

$$\text{Rule.—} W = \frac{k s v^2}{5 \cdot 2} = 3 \cdot 12 \text{ inches}$$

water-gauge.

My interpretation is:

$$\frac{0 \cdot 217 \times 24,000 \times 6 \cdot 25}{20 \times 5 \cdot 2} = 41 \cdot 2$$

Yours Truly,

NOVICE.

Been Creek, Pa., Oct. 1, 1886.

Care of Rods.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following answers to "A. C. S."

1. The first consideration would be where to get the material to build the places with. You do not say what kind of material the floor is. 2. 120,000 cubic feet per minute. 3. The best thing to do with dry rods is to clad them with oak cladding and keep them well collared. Wet rods made secure at the joints with four plates instead of two, and mounted with bevelled oak plates to keep the heads of the bolts from rubbing against the pipes.

$$4. \frac{360 \times 62 \cdot 5}{144} = 156 \cdot 25 \text{ lbs.}$$

on the square inch.

Yours, &c.,

M. D.

Houtzdale, Oct. 4, 1886.

Words of Advice.

Editor Mining Herald and Colliery Engineer:

SIR:—In a late issue of your valuable paper under the signature of "T." of Edwards, Illinois, is a communication entitled "Yielding Due Honor." I can fully concur with the correspondent that the board of examiners of Illinois at their last meeting did their duty to all, and much credit is due them. The examinations are of a rigid nature, and it is well for the state and for the candidates that they are. There is much matter that is placed before the students for solution that appears to be without meaning, and yet the sunlight of knowledge shows a vast difference. Looking over the past history of mining we see how few of the miners in the years gone past have been enabled to gain anything of an education, many of them having to enter the pits at a very early age in order to help to gain a living. Many of these boys who are now men can see laws enforced at the present day, which keeps boys out of the pit until the age of fourteen years, giving to the boy of the present time a much better chance. There are many who are striving after knowledge and seeking to find out some of the mysteries of mining, who never had but very limited advantages of an early education, and who use their spare hours for mental training. To such the work is hard and tedious and yet some men have done wonders by the utilizing of spare moments. I am acquainted with a young man in Pennsylvania who is now superintendent of one of the mines of the Bituminous region, who learned the multiplication tables after he was eighteen years old, and another one who is now mine inspector for one of the districts of the Bituminous region who tried for eight hard years before he passed the examination. Such will power will almost overcome any difficulties; such men make solid men. In looking over the past few years (only three) which have passed since the mine inspection laws were passed in this state, and noted how many had given up the struggle and how few have still kept up the fight in proportion to the great mass that work in our mines, it shows that but a few out of the many have a desire to climb up higher. Many because they fall once, are deterred from trying again. I would say to our class in Illinois: "Boys, if you don't at once succeed, try, try, try again." What seems to you now dark as midnight, with patient, hard study will seem in due time clear as day. Many will say the places for appointment are limited—which is very true—

but the day is not far distant when all mine superintendents and mine bosses must be qualified by education. The man with the necessary credentials in his pocket can dig just as much coal for a living and he feels a thousand fold better where he is enabled to discuss questions pertaining to his calling equal with any. There is no danger of suffering through too much intelligence among our fellow workmen; the danger rather comes from ignorance. I am very forcibly reminded at times through the columns of your valuable paper, of how many there are at the present time crying out for knowledge and grasping after light. It shows that at no age in the history of mining was there so much desire manifested among so many of our young men, to aspire as at the present. The tendency is a good one and worthy of encouragement in every mining community, and we know of no better way for any young man to spend two dollars than to subscribe for the MINING HERALD for one year, and if he is interested in matters pertaining to his calling he will continue to subscribe, for in its pages he will find all matters pertaining to mining ably discussed.

Yours, &c.,

HENRY E. LEES.

Galva, Ill., Oct. 3, 1886.

To Change a Clack.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following replies to "Student" and "C. J."

1. "Student": There are tables and formulæ in nearly all works on mining suitable for your first question. 2. You could not change the clack, as it is stationary and under water. You can change the bucket by drawing it up the pipes, and if the clack is useless there can be what is termed a false clack let down the pipes before the bucket is lowered again. 3. The hoist preferable would be a steam crane. 4. Let H = barometer, T = thermometer, W = weight of air, then

$$W = 1 \cdot 353 \times H - 429 + T$$

from which you can deduce what is wanted.

"C. J." $10 \times 60 = 600$ velocity in feet per minute

$$\frac{116640}{600} = 194 \cdot 4 = \text{area.}$$

$$\frac{194 \cdot 4}{7854} = 247 \cdot 5$$

$$\therefore \sqrt{247 \cdot 5} = 15 \cdot 73,$$

the diameter of pit in feet.

Yours, &c.,

R. A.

Wilkes-Barre, Pa., Oct. 2, 1886.

Pertinent Thoughts.

Editor Mining Herald and Colliery Engineer:

SIR:—In one of your last issues you mentioned that Cox Bros. & Co., of Drifton, Pa., were to reopen the school for miners and mechanics, which was established in that place some years ago.

Undoubtedly a great many of your readers would be interested in any information you or any of your aides would give concerning the rise, progress and fall of that school. I never saw anything about the closing of that school in the MINING HERALD, or elsewhere, and was under the impression that Cox was still keeping it up.

Was it not Mr. Cox's object in starting that school, to there educate young men in his employ to become bosses and other officials under him? Did it prove a success or a failure, and why?

Among the successful candidates, in the fourteenth district examination for certificates of qualification for mine-foremen, only one came from Drifton. That was a small number for a place having the reputation of being an unusually intelligent and select population, and besides having the advantage of a technical school. I am

Yours,

J. A. W.

Nanticoke, Pa., Sept. 29, '86.

Size of Regulator.

Editor Mining Herald and Colliery Engineer:

SIR:—In answer to your correspondent "R. W." with regard to the size of "regulator" required in order to secure an equal divisional distribution of 20,000 cubic feet of air respectively, first let us observe that as the quantity is inversely according to the square root of rubbing surface, we proceed as follows:

$$1. \quad \left. \begin{array}{l} 2,000 \text{ yds. } \sqrt{2,000} = 44 \cdot 7213 \\ 400 \text{ yds. } \sqrt{400} = 20 \cdot 0000 \end{array} \right\} 64 \cdot 7213$$

$$2. \quad \text{Then as } 64 \cdot 7213 : 20,000 :: 44 \cdot 7213 = \frac{20,000 \times 44 \cdot 7213}{64 \cdot 7213} = 6180 \cdot 19$$

quantity in long airway.

$$3. \quad \text{Then as } 64 \cdot 7213 : 20,000 :: 20 = \frac{20,000 \times 20}{64 \cdot 7213} = 13819 \cdot 67$$

quantity in the short airway = 19999·86, correct within 14 points.

$$4. \quad \text{Then with regard to the size of regulator } 13819 \cdot 67 : 6180 \cdot 19 :: 64 =$$

$$\frac{6180 \cdot 19 \times 64}{13819 \cdot 67} = 28 \cdot 6207 \text{ area}$$

$$\sqrt{28 \cdot 6208} = 5 \cdot 309 \text{ feet square,}$$

the required dimension.

5. By reducing the area of the 400 yds. airway, the direct object being to send along the 2,000 yds. airway some 4,000 feet more air. Now, to accomplish this more force will be required. Example:

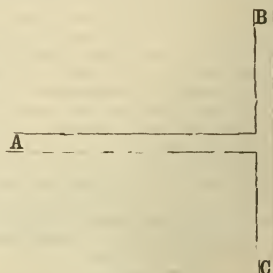
$$\frac{6180 \cdot 19 \times 50 \text{ (water gauge)} \times 5 \cdot 20}{33,000} = 4 \cdot 8690 \text{ H. P.}$$

Again:

$$\frac{10,000 \times 75 \text{ (water gauge)} \times 5 \cdot 20}{33,000} = 1 \cdot 1878 \text{ H. P.}$$

P. S.—The water gauge in this instance is, of course, based on supposition.

Second question of "R. W."—An air mine, A, is 800 yards in length, and at that point a division right and left takes, and as I take it, is as follows:



Equal in length and sectional area.

Now, both on grounds of theory and practice it is easily accounted for why the reading of the anemometer in A does not compare with the readings in B and C. In measuring air currents in mines with regard to the quantity passing through a given area we based our calculations on the velocity at which the air is traveling, therefore if 10,000 feet per minute is traveling in A when it is divided into 5,000 each for B and C, notwithstanding that the quantity in bulk is present, the force by which its presence is indicated is reduced; hence the reason for the difference in the readings.

"A. C. S.'s" third question.—The way generally adopted for strengthening "dry rods," or in other words, preventing oscillation, is to put "collarings" at every stay, fastened to the front stays. Also, nail 1 in. pitch pine boards on the spears.

Attention must be paid to the collarings, as they wear by the upward and downward action of the spears; consequently they must be renewed when necessity requires it.

The "Wet rods" can be strengthened by boards with bevelled edges being nailed on as the case may demand.

In answer to "A. C. S.'s" fourth question, what will be the pressure per square inch in pounds of a head of water 360 ft. high? Thus:—360 ft. = 4,320 inches; then $4,320 \times 0 \cdot 03617 = 156,25440$ pressure per square inch of water column.

Yours, &c.,

MAXIM.

Pittsburg, Pa., Oct. 6, 1886.

Curious Geological Find.

There has been a curious find in the rock that is being out in connection with the building of a branch road from the L. & S. station at Laffin to the new Keystone colliery in Plains township, Luzerne county, Pa. It is a find that will stir up the geologists in all directions. What appear to be the well preserved bodies of two large animals, and the petrified head of an immense snake, came out of a blast made in the shelly rock last week. The two animals are very strange looking specimens. They are nearly two feet in length and about of the proportions of fifty-pound dogs, though in their present state they will weigh at least two hundred pounds each. One has a head very much like a bear, with the facial features, nose, eyes, etc., distinctly marked, though the mouth resembles that of a frog. The other has a flat, square nose, or it may be that part of its face has been broken off. There are three marks on the side of this one, that look as though they might have been made by the bite of as many enormous teeth. Each of the animals was covered by a scale from one-fourth to three-fourths of an inch in thickness. The pieces of this scale look as though they might have belonged to a great turtle shell. The color and general appearance of the stuff is much like red iron ore. Underneath this shell there is a soft coating on the bodies that can be peeled off with a knife and resembles black lead. It may be that the remains are those of Saurian monsters of some kind. If there are but idiosyncracies, so to speak, of the rock formation, then they are very remarkable even in this respect, for they could not well look more like animal remains.

The Hudson river tunnel is being pumped out after being filled with water for two years. The announced purpose is to exhibit the work to capitalists to interest them in the completion of the tunnel. Col. Haskins announces that the structure is uninjured.

GELATINE-WATER CARTRIDGE.

Interesting Tests of Its Explosive Powers and the Safety of Its Use.

The first public experiments in Scotland with the new patent gelatine-water cartridge system of safety blasting in coal workings took place yesterday at Earnock colliery, near Hamilton. The explosive is the invention of Miles Settle, the managing partner of the Madeley coal and iron company, North Staffordshire. It consists in the construction of the cartridges in such a manner that the case containing the explosive—gelatine-dynamite—is completely surrounded by water. This is accomplished by placing the cartridge in a tin framework with three cornered diaphragms or projections, which keep it in position on the centre of an outer casing of waterproof paper or india rubber. This casing is then completely filled with water, and the result is that when the explosion occurs the flame is at once extinguished, and all danger of the ignition of the gas or coal dust, continually floating in coal workings, is obviated. Experiments with the new cartridge have been conducted on an extensive scale in some of the most fiery mines in Staffordshire and other parts of England with the most satisfactory results; and though the invention is not likely to be of so much practical utility in Scotland as in the English mines, where explosives are in common use and where the danger attending their employment is greater, considerable interest attached to the trials which, through the kindness of Mr. Watson, the explosives company were enabled to carry out at Earnock, and a large company, including H. M. inspectors of mines, and a number of the principal mine managers in the west of Scotland in consequence gladly availed themselves of the invitation to attend.

The visitors, furnished with safety lamps, were lowered in detachments to the bottom of the shaft, and spent some time in examining the appliances in use in the mine, one of the most thoroughly equipped in Scotland in respect of ventilation, lighting, and other matters. Electricity is employed as the illuminating agent in the main roadways, and it is likewise utilized in several other ways in carrying on the works. The company having all reached the bottom, Mr. Gilchrist led the way to the working face in a four-foot seam of coal, where the first experiment took place. The coal is worked on the longwall system, and near the top of the seam a hole some four feet deep, laterally, had been bored. Mr. Bonser, of Nobel's explosives company, assisted by Mr. Harvie took charge of the firing, which in each case was accomplished by means of electricity; and the visitors having seen the cartridge prepared and put in position, withdrew to a place of safety, only one or two of the experts remaining within view of the shot hole to watch the effect of the explosion. At a given signal the cartridge was fired by means of a magneto-electric battery. A dense, milky smoke almost immediately followed, but no smoke or offensive fumes were evolved, while those within view of the shot-hole declared that not a vestige of flame was visible. The charge used weighed about 2½ ounces, and an examination of the working face showed that about two tons of coal had been dislodged, and it was thought that in addition fully another ton had been loosened sufficiently to be broken up by the workmen in the ordinary way. This result was regarded as satisfactory so far as rendering effect was concerned; and it was also pointed out that the coal brought down was round and lumpy, with an exceedingly small proportion of dross. At some distance along the face, a dense, irregular spray of fine, and another four-foot hole had been bored, and in this somewhat heavier charge—3½ oz.—was placed. Everything being in readiness the visitors again retired along one of the workings for some distance; again, by means of the electric battery, the shot was fired, and with equally favorable effect, some 3½ tons of fine round coal being the spoil on this occasion. Again there was an entire absence of flame after the explosion, though it was thought by some there was rather more steam or smoke than in the first experiment. The explosive was afterwards submitted to a more thorough and severe test by the firing of which is known technically as a "brushing blast." In the roof of the roadway, in order to give an additional height, a portion of the rock lying immediately above the coal is removed as the seam is gradually worked out. In this rocky ledge a charge of 7 oz. of the gelatine dynamite, equal to about 2½ lb. of gunpowder, was placed in a shot hole some four feet in depth. In this case the explosion was followed by a sharp reverberating sound, and a large quantity of smoke and steam was evolved, but there was not the slightest appearance of flame. On examination it was found that the whole of the "brushing," about two feet in thickness, had been rent away, and that the explosion had penetrated about eighteen inches beyond the shot hole, or altogether over a surface area of about 54 feet. This completed the experiments in the coal workings, but on the way to the pit-mouth the company were shown the effect of a "blown-out" shot. This, it may be necessary to explain, is a shot which, having been insufficiently stemmed, is ejected from the shot hole as a bullet

from a rifle or any similar weapon, and it is a notorious fact that this is a fruitful cause of explosion in fiery mines, the flame coming more directly into contact with the fine coal dust as all times flying about the workings than when the explosive agent accomplishes its proper purpose. To illustrate the action of the new cartridge in such circumstances a shot was fired from a hole bored in the solid rock forming the wall of one of the principal roadways. This experiment had the further advantage of enabling the whole of the company to see for themselves that not a vestige of flame followed the explosion. Incidentally they also saw the superiority of the magneto-electric battery over the ordinary fuse in discharging the shot. In the first instance the battery failed to act. Mr. Bonser at once saw that something had gone wrong, ordered the battery to be disconnected from the wire attached to the cartridge, and then in perfect safety he proceeded to ascertain the cause of the failure. A moment's examination led to the discovery that two of the copper wires had become entangled, and that the current had in consequence been diverted. The contact being removed, the wire was again attached to the battery, and the shot discharged with the most satisfactory result. This finished the series of experiments below ground; but on reaching the surface, Mr. Bonser proceeded to give, if possible, still more conclusive evidence of the effectiveness of Mr. Settle's invention. Procuring a quantity of fine coal-dust, he placed a cartridge in the centre and fired it by means of electricity. The dust was blown high into the air in a dense black cloud, and there was no flame. Next he put a charge of gunpowder in an equal quantity of coal-dust, and firing it by the same method produced a brilliant pyrotechnic display. Then, finally, he took a quarter-barrel of gunpowder, 25lb. weight, poured it out on the ground, placed a cartridge in the midst of the heap and discharged it, with no further effect than the scattering of the powder over the ground, where it was subsequently ignited with the aid of an electric fuse to prevent accident. The experiments lasted nearly three hours, and were followed with the closest attention by the practical men present. On one point all were agreed—namely, that the water cartridge might be fired with absolute safety in circumstances where it would be impossible to use any other explosive. With regard to economy in use in mines where other explosives may be safely employed, further evidence was desiderated. This was the opinion expressed by Mr. Gilchrist in acknowledging a vote of thanks to Mr. Watson for permitting the experiments to take place in his admirably-appointed works, and it met with the general concurrence of all who had the privilege of being present.—*Glasgow Herald*.

CARE OF MINE CABLES.

Further Information on an Important Point in Mine Economy.

Too much care cannot be used in looking to and treating cables in mines, when life depends on their good and safe condition. The following treatment of mine cables is said to be a perfect anti-friction and preserving compound:

Tallow softened by heat, seven parts; plumbago, three parts; mix well. Apply thus: Make a long, hollow box or trough; gouge out a 4x6 piece of timber, eighteen inches or two feet long. Saw down the timber previously, lengthways, and hollow out the trough sufficiently to hold several pounds of the compound, making a hole lengthways of the trough for the cable to run through. Affix to rope and secure by clamps; have the box made stationary while in use, and permit the rope to pass through it while descending or ascending. It will be then thoroughly coated. This done twice a week or oftener will preserve a steel round cable far beyond its usual time of wear. Remove when treated with the compound. Raw lined oil may be used instead of tallow on flat steel cables in much the same proportions, only add a little more plumbago if necessary to get the proper consistency. If tar is used, lined oil must be added to prevent adhesion. Both ingredients should be mixed warm to prevent the tar from sticking to the fine strands of the cables. Tar of itself wears out and destroys more cables than the casual observer has any idea of, for from its natural sticky properties it displaces the fine strands, wires, etc., by adhesion and violent disruption, while being paid off or unwound from drums, hence the damage. The plumbago and tallow is far ahead of anything known.

Then again, a mixture of common molasses and plumbago applied in the cams of quartz mills is a good anti-friction compound. It is made in the following proportions: Molasses, five parts; plumbago, one and one-half parts; mixed as paint would be made so as to be thoroughly incorporated. This will save the cams and tappets from undue wear, and prevent heating. It further obviates the use of any noxious or filthy materials, and the molasses, when oils are used, if any of this compound shall fall into mortars it will do no harm to amalgamation.

Wanted.—Active agents to introduce our mining machinery specialties. Big money in commissions or salary and expenses paid. Address H. P. S. F., M. Co. Box 115, Newport, Ky.

A NEW PUMP.

Description of a Machine Which Will Pick up Anything Not Riveted Down.

Peter E. and Joseph G. Falcon, the submarine divers, have secured a patent on a pump for excavation and other purposes which is attracting considerable attention at the exposition. Experiments thus far have proved successful, and loose matter of all kinds, even boulders, have been removed from river-beds at a depth of ten, twenty, and forty feet. The suction is so great that a \$20 gold piece laid flat on the river bed has been raised, and the inventors claim that an eight-inch pump will do the work of one hundred men, and a twelve-inch pump that of two hundred and fifty men. The fans permit anything to pass through them owing to their flexibility. The pump is really centrifugal with flexible fans, and that is why the Messrs. Falcon were enabled to obtain a patent on it, as it is just as good for excavating as for any other purpose. Any solid matter can be removed by the patentees, who operate a steam jet in connection with the pump, and if this is not effective they can accomplish what they desire through the assistance of the submarine armor. Through their ingenuity they have effected what tunnelling and other contrivances have endeavored to bring about, and they have received several letters from various sections of the United States and South America congratulating them on the results. They have experimented for four months, and found the pump to work satisfactorily, and have overcome the obstacles heretofore encountered in the removal of the stones and other material from rivers, and they are now about to test the pump in California, on the spot where one of them in 1851 picked up a twelve pound piece of gold.—*Chicago Times*.

Gold in South Africa.

The gold fever that has laid hold upon South Africa threatens to rival in its heat and intensity the earlier days of the Australian and California gold-fields. Every mail brings the news of fresh "rushes." In addition to the established fields of the Transvaal, gold appears to have been found at Witwatersrand and in the Heidelberg and Waterberg districts of that republic. Discoveries are also reported in the reserve territory of Zululand, near the Natal border, in distant Amaswaziland (a native state east of the Boers) in the Krusent districts of the Cape Colony, and even in the Orange Free State. Such alluring miners' names as "Queen of Sheba Reef," "The Wheel of Fortune," and others, are upon the tongues of everyone, and speculation grows rampant. It is to be said, to the credit of South African newspapers, that they are warning their neighbors to exercise caution. It is pointed out that of the six thousand people now at the Transvaal gold-fields, only a small proportion are earning wages, and many will return to die of starvation on the road. It is a characteristic of South African gold that is usually found in quartz reef, and powerful crushing machinery is therefore demanded for its extraction. The new fields consequently are not likely to afford great facilities to the small digger who works his own claim.

It is a mistake often made to assume that any old, worn out boiler is "good enough to use for heating." While it is true enough that a boiler which may not be strong enough to run at eighty pounds pressure, will answer very well to run at a somewhat lower pressure, we do not think it quite safe to use for heating, or any other purpose, a superannuated or worn-out boiler. In many cases it is not the steam pressure in itself which is alone to be considered, but the strains resulting from the conditions of every day use, to which every boiler is subject, without regard to the actual pressure carried. If the boiler has been used for a long period, and there is the slightest ground for thinking the plates unsound and brittle, it should be rejected for any and all kinds of work. It is a mistake to suppose that no serious explosion can occur the pressure does not exceed twenty or twenty-five pounds per square inch. Many very destructive explosions have occurred at these pressures, and will continue to occur so long as unsound boilers are used.

The Baldwin locomotive works, Philadelphia, have just completed and shipped engine number 8,000. These works built their first locomotive in December, 1832, and the annual average for twenty years was only twenty-five. The second 500 were built in eight years, No. 1,000 being finished February, 1860. The next six years saw the third 500 built, and the next three the fourth 500. The fifth 500 were built in two years, and the sixth and seventh each in one year, engine No. 3,500 leaving November 20, 1873. Business then slackened, three years being required to build the next 500, and two years the following 500, engine No. 4,500 leaving December 17, 1878. Then trade improved, 500 engines being built in fifteen months, and 1,000 more engines in twenty-two months, while 500 more engines were finished in ten months, No. 6,500 leaving December 6, 1882, and marking a half century for the works. The next eight months saw 500 more built, and before the close of 1884 No. 7,500 was turned out. Work has again slackened, and nineteen months were required for the final 500 locomotives, No. 8,000 having just left the establishment.

COAL DUST.

INTERESTING AND IMPORTANT EXPERIMENTS TO DETERMINE ITS EXPLOSIVENESS.

How Fire Damp and Blasts Affect It.

From "Transactions of the Mining Institute of Scotland."

The part played by coal dust in colliery explosions has of late years attracted considerable attention. It seems unnecessary even to epitomize the history of its development further than to point out that the possibility of flame produced by explosions igniting coal dust was first suggested by Robert Bald, the acknowledged father of mining engineering in Scotland, as far back as 1828; that even before this, Buddle, the famous North country viewer, noticed how the survivors most distant from the point of explosion were burned by the shower of "red hot sparks" of the ignited dust which it drove along; that the role played by dust was as clearly demonstrated by Faraday & Lyell in their report on the explosion at the Haswell collieries in 1844 as it is at the present day; that the subject was in France re-investigated, in ignorance of Faraday's results, between 1855-75; and that from 1875 onwards it has claimed the attention of Galloway and Marreco, and also of the north of England, and the Chesterfield and Derbyshire institutes of engineers.

Although Vital and Marreco had concluded that flame could be propagated with explosive effects by coal dust alone in the absence of fire-damp, the evidence given before the commissioners by Her Majesty's inspectors and others was to the effect that coal dust might aggravate explosions, but that they could not be originated or propagated by that means alone. Mr. Hall, inspector of the North Wales district, however, gave evidence of the first practical experiment known. It was made in a brick arched mine, forty-five yards long and thirty feet area, driven from the surface. The flame from a 2½ lb. shot, stemmed with small stones, only extended to fifteen feet; but when coal dust was scattered on deals (the pavement was wet) the whole length of the adit, on firing a similar shot, stemmed with small coal, the flame extended along the whole length of the mine, issuing in large volume from its mouth. The blast was so fierce that it would have been fatal to any exposed to it.

Mr. Galloway, in evidence, also expressed a strong belief that the most extensive of recent explosions were largely contributed to by coal dust.

There was so much difference of opinion that when the terrible calamity happened at Seaham in 1880, the then home secretary requested Sir F. Abel to make experiment with samples of dust collected from different parts of that mine.

The experiments were conducted with blower gas at Garswood colliery, in a channel twenty-eight feet long, having a sectional area of about a square foot. Arrangements were made to secure uniformity in the velocity of the air currents, and also of the proper proportion and thorough diffusion of the gas in the air, and to keep the temperature of the currents similar to what would be found in collieries.

In a current having a velocity of one hundred feet per minute, Leycey (very inflammable) dust suspended in air containing 1½ per cent. of gas, produced a long flare as it passed the naked light, and after a short interval inflammation took place throughout the entire gallery.

A series of comparative experiments with several different dusts was instituted to ascertain the proportion of fire-damp which requires to be present in a dust-laden current, traveling at the rate of 600 feet per minute, in order to produce an explosion.

Dust from the Madeley and Leycey collieries produced explosive mixtures with air containing only 2 per cent. of gas.

Samples of dust from Seaham, Blantyre, and Newport-Abercarn collieries gave the same result when the current contained 2½ per cent. of gas.

These dusts were rich in coal and very fine, but one dust from Seaham, which chemical examination showed to be the poorest in coal (half of its weight being incombustible matter), and which was not so fine as the others, sufficed to produce an explosion with 2½ per cent. of fire-damp. The behavior of this latter dust caused Abel to suspect that the ignition of the mixtures was not altogether due to the fact that the dust contained coal, but that the physical characters—the lightness, porosity, and state of division—of the dust had had something to do with it. He, therefore, tried the effect of adding a fine, readily floating, incombustible dust—calcined mag-

nesia—to the current, and found that with 2½ per cent. of fire-damp long flares of flame were produced within a few seconds of the mixture first passing the flame, and the inflammation speedily spread with feeble explosive effect. Other dusts were tried—kaolin, powdered flint, pumice stone, and slate dust—with similar results. With currents of 1000 feet velocity the effect of any one of these dusts being deposited in the gallery was to cause the instantaneous ignition if they contained 3 to 3½ per cent. of gas.

We saw when discussing the ignition of fire-damp that currents of high velocity containing no dust were not inflamed until after they had been passing the lamp flame for some time; and that, in the light of what we have just noticed, is probably accountable to the fact of the current carrying particles of dust which have become accidentally suspended in it. These small dust particles, being instantaneously raised to incandescence, intensify the heat at the point and ignite the gas. The results also seem to favor the view that some dusts exert a contact—or catalytic—action similar to that we saw was possessed by platinum. When using magnesia it was noticed that a dark space intervened between the igniting flame and the flare produced by the ignition of the gas mixture, which seems to show that the dust particles after passing through the flame, establish some oxidation of the fire-damp, the dust becoming more highly heated by the chemical action as it passes on, until at a short distance from the flame it becomes hot enough to ignite the gas and air mixture.

These experiments prove conclusively that a current containing dust in suspension may be explosive when the quantity of gas present is so small as to escape detection by a Davy lamp.

The next experiments were to determine whether coal dust would become ignited and convey or propagate flame in the complete absence of fire-damp.

With the view of imitating an explosion, a quantity of loose gun cotton, laid on the floor of the gallery, was electrically ignited and the length of flame noted (1st) when no dust was in the current, and (2nd) when dust was present. At velocities of two to three hundred feet the volume of flame was decidedly increased by the dust cloud, and the increase became more marked when the velocity of the current was raised to 1000 feet per minute. In the latter case in the gallery free from dust a flame of 15 feet was obtained, which increased to 15 feet with inflammable dusts. The dust had the effect of increasing the flame in the direction of the current and reducing it in the opposite direction, but there was an increase over all of 3 feet.

Numerous experiments were made to imitate the action of blown out shots, by firing small charges of powder from cannon into a current containing dust in suspension; but except that at the high velocity of 1000 feet per minute decided indications were obtained that dust particles were inflamed, giving an increase of the volume of flame produced, the experiments gave only negative indications.

These results would seem to show that flame cannot be propagated to any great distance by coal dust alone.

Experiments were also instituted to ascertain the effect of blown out shots in igniting gas and air mixtures containing coal dust in suspension.

Cannon, when fired into air currents of 100 to 200 feet velocity containing 2½ per cent. of fire-damp, and into a current of 300 feet velocity containing 3½ per cent. of gas, produced no effect. But when discharged into a current containing only 2½ per cent. of gas at a velocity of 100 feet, with coal dust thickly suspended in it, the portion of the gallery in front of the flash was filled with flame; with 2 to 2½ per cent. of fire-damp, the gas and coal dust mixture fired with explosive effect.

In 1881 Mr. Hall directed the attention of Sir F. Abel to the fact that one fatal and one serious accident had happened in his district, both occasioned by blown out shots. In both cases the sufferers had retired round a corner to places 100 feet distant. There were signs of charring on the props 6 feet beyond where the men had been, and although the shots contained only 1 lb. of powder, there was a strong impression, among mining men on the spot, that the unalloyed powder flame (coal dust was known to be present) would produce the accidents. Sir F. Abel made some experiments on a large scale to ascertain to what distance the burning effect of a blown out shot would extend. They were made in the military galleries of Chatham fortifications, and the results we have collected into a table. They show how the flame is affected by the velocity of the current, by the quantity of the dust present, and by the dampness of the air; and prove that the accidents Mr. Hall referred to could not have resulted from the powder flame alone, and were probably caused by the shots igniting the dust.

SHOT LBS.	LENGTH OF FLAME FEET.	
	Without Dust.	With Dust.
2½ lbs. Tamped.....	15	135
1½ to 2½ lbs. { Tamped { Untamped,	20	37 to 45
1½ lbs. Untamped	32 to 35	53, Tamped
.....	.....	66
.....	.....	26
3 lbs. Untamped,	.....	70

Experiments in gallery 81 feet long, intersected by

another gallery at a distance of 70 feet from the gun. A current of 70 feet per minute passed from the gun into the left gallery. Charge, 3lbs. powder, untamped.

	LENGTH OF FLAME FEET.		
	Main Gallery	Left Gallery	Right Gallery
Slight quantity of dust, 50	0	0	0
Greater quantity, 70	0	0	0
Still greater quantity, 81	12	18	3

In these experiments the dust was blown into the air the air, generally to the rear of the gun—not raised by the shots as in mines.

TO BE CONTINUED.

Sketch of E. B. Byington.

The New York World gives a portrait and the following sketch of Edward B. Byington, general passenger agent of the Lehigh Valley, a popular railroad man:

Few men have more warm personal friends or better executive ability than Edward B. Byington, general passenger agent of the Lehigh Valley railroad. Twenty-five years ago he began his career in railroad circles and attracted the attention of some of the best men of the day, who saw in the then young man the promise of a successful future. In Chicago, St. Louis and elsewhere in the west he left traces of his rare executive ability, being among the very first to introduce the ticket-office system for the sale of railroad and steamboat tickets. In St. Louis he did an enormous business, and was as well known to the people of that city as their principal thoroughfare. Here he married Mrs. Munson Beach, a popular society lady, and later on he came east. Fifteen years ago he entered the employ of the Lehigh Valley road, with headquarters at Buffalo. Then the road was given up almost entirely to the coal traffic, but Mr. Byington saw that there was a splendid opportunity for the company to compete successfully with its formidable rivals, and he urged such a course. The office of general passenger agent was created and Mr. Byington was installed at Mauch Chunk, where he now is surrounded by a full staff of competent assistants, with a branch office at No. 235 Broadway. He put on fast passenger trains, including the celebrated "Comet" express, which makes the trip from Buffalo to New York in twelve hours. He started projects for picnic groves at reasonable intervals along the entire route. On the top of one of the high mountains a mammoth hotel arose, at a place called Glen Summit. A beautiful hotel called the Wahneta was erected opposite the favorite excursion grounds at Glen Onoko, and all along the Lehigh Valley the company has become distinguished as a civilizer and earnest advocate of internal improvements.

During the present season the passenger traffic of the road has shown an enormous increase over the previous year, over 250,000 passengers having been carried to Glen Onoko alone, without the loss of a human life or a single serious accident. One hundred and five trains passed along the road daily at easy intervals, and everything moves like clock work. Mr. Byington is a Knight Templar Mason, and is regarded as one of the most popular men in the order. In Mauch Chunk he knows and has a pleasant word for every man, woman and child, and among the officers and stockholders of the road his ability as a passenger agent is known and appreciated, and his rare qualities as a man and citizen are universally acknowledged.

Coal Property Advanced From \$3,000 to \$100,000.

The Corona mine, one of the most valuable mines in the Alabama, was purchased lately by L. B. Musgrove for Penn-Mobile coal company, composed of General Coulter, Major Jones, Messrs. Huff, Francis and others, some of the wealthiest coal dealers of Pennsylvania, and a number of Alabama's most enterprising citizens, a few of whom are Gen. Joseph Burke, Gaylord B. Clark, Esq., Adam Glass, Esq., of Mobile, and Messrs. L. B. and J. C. Musgrove, of Jasper, Walker county. Just three years ago L. B. Musgrove could have gotten this property for \$3,000, for which he has just paid over \$100,000; and the present owners would hardly take a fifty per cent. advance on it today. The property was owned by a stock company, the controlling part of which being in the hands of Columbus, Mississippi, gentlemen, and for the past year or so the mine has been leased by F. C. Gunn & Company. Numbers of mules, plow wagons, etc., have been bought, and the Penn-Mobile company propose beginning work at once. This company owns in addition over eleven thousand acres of valuable coal lands, also in Walker county. The capacity of the Corona mine is said to be five thousand tons a day, and is the best steam and domestic coal in the market. The principal shipping points being Mobile and New Orleans.

In the annual reports of the state mining inspectors just submitted to the governor of Pennsylvania, Inspector William Jenkins, of the Second Allegheny county district, says the condition of the mines in that county is such that some of them do not come up to the standard. James Blick, Inspector of the seventh district, says that in his district there are a number of mines with miserable ventilation. He also calls attention to the laying of the natural gas pipes above the mines believing that they are liable in case of a leak to cause very destructive explosions.

TRADE REVIEW.

COAL TRADE.

There is no mistake about there being an active demand for coal in all the markets to which anthracite finds an inlet. Despite their utmost endeavors the coal-carrying companies fail to find cars enough to transport coal to the city markets and seaboard as quickly as the orders for supplies necessitate, which is the strongest proof that the operating side of the trade has now the business call. Up to last Saturday the yearly production had gained almost 700,000 tons over last year, a fact which reflects ridiculously on the action of the state authorities in the matter of the pools. A restriction which shows a legitimate and natural increase in production is certainly not of such serious injury to the public that any but jobbing politicians would make a hubbalooboo about it. That action has not in any sense, so far as apparent, worked disadvantageously to the coal trade. It was proclaimed this week that the legal machinery was at once to be set in motion for the suppression of the pool, but up to this writing nothing has transpired. In the matter of prices the circular rates are reported to be well maintained. The coal meeting held in New York on Friday decided to make no further advance in rates. Apropos to prices and the combination, an investigation into those now prevailing as compared with those of other years shows that New York harbor prices have been lower for six months this year than ever before in the history of the trade, namely, \$5.76 for Wyoming and Lackawanna coal, all sizes, against \$3.41 for '84 and \$3.84 for '81. The average prices for the month of October have been as follows: \$3.25, \$3.24, \$3.29, \$3.71 and \$3.98 for the past five years. Nearly all the companies are making large shipments westward in order to take advantage of canal freights. In a month or so the Erie canal will be closed for the winter, and thereafter anthracite will have to be sent either via all rail or by rail to Buffalo and then by lake. This latter way cannot be used very much longer either, so it is imperative upon the companies to supply their western trade at once.

Stocks of coal at distributing points are reported light, while all the companies are said to have sold large quantities for delivery during the next three months. The outlook is very favorable for a heavy demand through the fall and winter months.

The official September anthracite shipments, as prepared by John H. Jones, Esq., and which appear in full tabular form elsewhere, show the trade to be still in an excellent position statistically. The production for the month, 2,896,472 tons, exceeded the allotment 126,472 tons, but it was 362,711 tons less than last year. The stock of coal on hand at tide ports showed a decrease of 130,753 tons, and it is now but 518,306 tons, the lowest amount for more than a year, and only about five days' requirement for the trade under active.

The bituminous trade is unchanged in its heretofore reported condition of a brisk business with but little profit. The coke trade is said to have an improving aspect, the increasing demand from the iron furnaces causing almost all the available coke ovens to be worked to full capacity.

The total amount of anthracite coal sent to market for the week ending Oct. 9, as reported by the several carrying companies, was 770,406 tons, compared with 763,007 tons in the corresponding week last year, an increase of 7,399 tons. The total amount of anthracite mined thus far in the year 1886 is 23,971,851 tons, compared with 23,168,624 tons for the same period last year, an increase of 803,227 tons. The following statements give the gross tonnage of each of the leading coal carrying companies for the week ending Oct. 9, and for the year to same date, compared with the respective amounts carried to the same date last year:

Week	1886	1885	Difference
Reading R. R.	318,223	10,833,177	10,313,355
Lehigh Valley	148,738	5,403,262	5,084,197
D. L. & Western	132,336	3,781,291	3,621,804
Shamokin	19,963	612,270	755,195
Ut. & N. J.	37,729	1,257,095	1,293,990
Penn. Coal	35,409	1,105,845	1,017,742
Del. and Hudson	89,731	3,095,142	2,844,762
P. and N. Y.	44,122	1,542,201	1,339,038
Cleaveland P.	49,362	1,617,386	2,160,143
H. and B. Top	11,155	510,674	47,143
Nor. and Wtn.	19,471	656,528	438,927

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Oct. 9, was 271,253 tons, of which

293,344 tons were coal and 65,909 tons coke. The total tonnage for the year thus far has been 11,465,462 tons, of which 8,837,846 tons were coal and 2,627,616 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending October 16, was 315,000 tons, of which 30,900 tons were sent to and 34,700 tons shipped from Port Richmond, and 29,000 tons were sent to and 32,000 tons shipped from Elizabethport.

The shipments from the mines of the Cumberland coal region for the week ending Oct. 9 were 73,329 tons, and for the year to that date 1,829,286 tons, a decrease of 303,904 tons as compared with the corresponding period of 1885.

THE COKE TRADE.

The coke syndicate at their regular monthly meeting in Pittsburgh, this week had before them a general review of the market. It was decided to reaffirm the selling price of coke for last month and to run all of the ovens at their full capacity. The regular selling price of coke for the ensuing month will be \$1.50. To dealers it will be \$1.60 and to foundries \$1.75.

The Connellsville district is suffering greatly each week from the scarcity of cars. An operator, in speaking of the situation, said: "The real trouble is a lack of motive power. If the coke cars were handled more promptly by the railroad people there would be a sufficient number of cars. But as there is not sufficient to handle the cars the result is that we cannot get all of our output shipped. Last Friday the syndicate shipped 513 cars of coke, and had orders for 800 cars. On Saturday the shipments amounted to 620 cars, which was 180 cars short of orders. There are manufacturers today anxious to blow in blast furnaces that are idle. But it now requires all the coke that can be handled by the railroads to supply the furnaces that are in blast. Until the railroads secure more motive power there is not much hope of the idle blast furnaces being blown. Coke is accumulating very fast in the yards of the different works in the Connellsville region because of a lack of motive power. At present everything is in full blast at the coke works, while at the same time last year there were but 50 per cent. of the ovens in operation. Yet it certainly indicates a wonderful improvement in business. There is not much profit, though, in the coke business at present. This very lack of transportation facilities puts a largely increased cost upon the production, as it necessitates stocking in the yards at the works, and a reloading of the coke. The demand for cars for shipments in other branches of trade also operates against us, as it requires extra motive power to move them."

Chicago.

From the Industrial World.

The conditions of the anthracite coal trade are very much as stated above. Dealers are daily obliged to refuse good-sized orders for car lots and larger amounts on account of their inability to make early deliveries. In the matter of values there has been no noticeable change. The total business of this year to date is reported at 23,118,744 tons, against 22,394,226 tons in a like period in '85.

In bituminous coal there is an improved and active demand, but it has in no way created any advance in the card rates. Shipments and receipts alike are heavier. Stocks in the local yards are abundant, although there is still some trouble in filling orders for rail coal from the more eastern districts.

The coke market is fully as active as it has been in the immediately preceding weeks, although no alteration in values has been accomplished.

Receipts of cannel coal are a little heavier, and a more general movement in the same is noted.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.

Per gross ton by carload, 2240 lb.	
Grate.....	\$ 6 15
Egg.....	6 15
Sieve.....	6 45
Nut.....	6 45
Lehigh Lump.....	8 40
No. 4.....	6 75

Per net ton by carload

Grate.....	\$ 5 0
Egg.....	5 0
Sieve.....	5 75
Nut.....	5 75
Lehigh Lump.....	7 50

BITUMINOUS.

Erie & Briarhill.....	\$4 35
Pittsburg.....	3 25
Indiana Block.....	2 65
" " Slack.....	2 50
Baltimore & Ohio.....	3 00
Hocking Valley.....	3 00
Youghiogheny.....	3 25
Winnington.....	2 10
Blossburg.....	3 25

Cumberland Smithing.....	3 25
Sonman Smithing.....	3 50
Grape Creek.....	2 00
Fountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Minonk.....	2 00
Morris.....	2 00

CANNELS.

Kanawha.....	4 70
Buckeye.....	4 20

COKE.

Connellsville Coke.....	4 75@5 00
Crushed Coke.....	4 75@5 50
Charcoal, carload per bu.....	8 1/2@8 3/4

Pittsburg.

From the American Manufacturer.

There are no new features at present. The Ohio is still too low to permit the movement of coal craft, whether loaded or empty. Mining along the Monongahela continues almost entirely suspended, in consequence of the scarcity of empty vessels, and prices are without change. The few miners who are at work are receiving 2½c. per bushel, the price that has prevailed all summer. At the railway mines there continues to be a fair demand, but prices remain low. We repeat the quotations of last week:

PRICES AT PITTSBURGH.

River, wholesale, on board.....	3 1/2@4 1/2 cts. per bushel.
Railroad.....	4 1/2@4 3/4 cts. per bushel

AT CINCINNATI.

River, wholesale, on board.....	5 1/2@6 1/2 cts. per bushel.
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AT LOUISVILLE.

River, wholesale, board.....	5 1/2@6 1/2 cts. per bushel
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AT NEW ORLEANS.

River, wholesale, on board.....	25@26 1/2 cts. per bu.
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Bushels are rated among dealers here at 76 lb., or 26 1/2 bushels make a ton of 2000 lbs., approximately.

The barrel that rules the coal measurement in New Orleans contains 2 4/7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Connellsville Coke—Demand continues very large, but the operators are complaining very emphatically about the scarcity of cars. We continue to quote as follows: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Anthracite Coal Tonnage.

Statement of anthracite coal tonnage for month of September, 1886, compared with the same period last year.

This statement includes the entire production of anthracite coal, excepting that consumed by employees, and for steam and heating purposes about the mines.

	SEPTEMBER, 1886.	SEPTEMBER, 1885.	DIFFERENCE.
Phila'da. & Read. R.R.	1,084,257 01	1,166,061 16	D 81,804 15
Lehigh Valley R. R.	633,111 11	651,033 05	D 17,921 14
Del. & W. R. R.	452,370 16	524,016 02	D 71,645 06
Del. & Hud Canal Co.	292,831 19	359,061 10	D 66,129 11
Pennsylvania R. R.	322,285 07	331,182 08	D 8,897 01
Penn'a. Coal Co.	155,751 09	161,153 13	D 5,402 04
N. Y., L. E. & W. R. R.	55,863 18	66,774 12	D 9,910 14
Total.....	2,896,472 01	3,259,283 06	D 362,711 05

	FOR YEAR 1886.	FOR YEAR 1885.	DIFFERENCE.
P. & R. Railroad	8,110,899 04	8,133,290 18	D 22,391 14
L. V. R. R.	4,293,960 03	4,117,116 01	176,850 03
D. L. & W. R. R.	3,618,260 04	3,428,491 19	186,768 05
D. H. Canal Co.	2,494,245 07	2,211,415 11	282,829 13
Penn'a. Railroad	2,521,883 16	2,412,178 09	79,705 07
Penn. Coal Co.	974,505 13	1,014,147 13	D 37,582 00
N. Y., L. E. & W. R.	524,832 12	440,757 12	83,596 00
Total.....	22,535,197 19	21,788,422 05	I 749,775 14

The stock of coal on hand at tide-water shipping points, Sept. 30th, '86, was 518,306 tons; on Aug. 31st, '86, 649,059 tons; decrease, 130,753 tons.

JOHN H. JONES.

Accountant.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Oct. 16, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	171,611-04	1,794,363-18
Shipped South.....	64,494-00	3,126,032-09
Total.....	136,105-04	3,920,396-07
For corresponding time last year.....	68,336-13	1,808,819-11
Shipped North.....	65,561-19	1,946,883-13
Shipped South.....	133,898-12	3,765,703-04
Total.....	199,460-31	5,712,586-17
Increase.....	62,355-27	3,802,090-10
Decrease.....	2,250-27	164,633-03

The Grand Union hotel, New York city, has published a useful little memorandum book which will be mailed to any address on receipt of a 2c stamp.

Address, "Advertising Department,"

GRAND UNION HOTEL,
New York City.

THE MINES OF MEXICO.

A Country Rich in Mineral Wealth—The Onyx Wonders of Puebla.

Charles Lyell, the eminent geologist, says that the interior of Mexico is the richest known argentiferous section in the whole world. The fact was long ago established that a metalliferous vein runs without interruption through the entire length of the cordillera of Anahuac, extending from the Sierra Madre, in Sonora (near the northern border), to the gold deposits of Oaxaca, in the extreme south of Mexico. This exhaustless vein traverses no less than seventeen states, and since the day of its discovery its mineral yield has been more than \$4,000,000,000 worth. And yet the available sources of wealth are estimated to be not more than 1 per cent. of the undeveloped and undiscovered whole.

At the beginning of the present century there were according to the calculation of Baron Humboldt, at least 500 localities celebrated for these mines comprehending about 5000 separate excavations. These mines became the nuclei of small villages, giving an impulse to agriculture in the surrounding sections as well as to commerce, so that in time many of the rude pueblos developed into populous cities.

Nevertheless, as an English minister recently stated in his official report, "mining has been confined to a few central spots adjacent to large populations, and yet if one examines these spots he will find that more than 300 years of constant productiveness have not exhausted the principal mines already worked, while by far the largest proportion of the great seams remain untouched in each."

The Mexicans need foreign capital, and invite it, for some of the richest and most famous of the old mines, which were once marvelously productive, have been filled with water for more than a century, and the persons to whom the property has descended have not money enough to clear them out. Then there are hundreds of other mines that have been worked only on the surface with hammer and drill and hamp, and there are "tailings" of many imperfect excavations which are richer than mother veins.

In many portions of Mexico Indian incursions have hitherto hindered operations and rendered valueless a vast amount of machinery, and lack of fuel as well as difficulty of drainage has caused lucrative works to be suspended. Says Mr. Charles Haskock: "Now the situation is wholly changed. Two thousand miles of railroad have opened up a great extent of country and given protection to labor and capital; they have cheapened prices by facility of transportation, and stimulated intercourse between people who were hitherto strangers to each other and almost hostile. Periodical revolutions and wars between native factions no longer interrupt business. Civil strife is at an end. Wise rulers and wise counsels prevail. The era is propitious."

Besides free silver and gold, there is copper, iron, tin, lead, quicksilver, sulphur, alum, vitriol, cinabar, ochre, zinc, asphaltum, amber, "and lastly—to mention a wonderful variety of marbles, jasper, alabaster, onyx, obsidians and gems of 'purest ray serene'.

Mexican mining is generally conducted on the most primitive plan according to the Spanish and Indian method of four centuries ago. Some queer statements are made concerning placer gold. This precious metal is generally taken from the alluvial soil by means of washing. Extensive gold grounds of this character are found in the state of Sonora, especially along the valley of the Rio Yaqui; also still farther north, in the Pimeria Alta under the thirty-first degree of latitude, where many *pepitas* (lumps) of pure metal have been picked up weighing from four to six pounds.

There is scarcely a silver mine which does not contain more or less gold. It is extracted from seams which traverse the primitive mountains, either in gneiss or micaceous slate—especially in the rich state of Oaxaca, which is the California of Mexico, as far as gold is concerned. Native gold is found crystallized in octahedrons, or as laminae, or in a reticulated form—particularly in the silver ores near Guanajuato, west of Delmingo, and in Guadalajara. It is claimed that a thread of gold has been traced throughout the entire length of the Sierra Madre—the real "backbone" of the republic—but only at comparatively rare intervals has it been taken up and pursued with profit.

The early Spaniards found among the Aztecs a great quantity of toys, ornaments and other articles in solid gold, such for example, as golden disks larger than an ordinary cart-wheel, the golden breast-plates of the idols, linings of the temple walls, Montezuma's throne, palanquin, etc. Historians tell us that in 1523 Cortez sent to his sovereign a culverin of pure gold, which was valued at 20,000 ducats; and all readers are familiar with the astonishing discoveries which the greedy *Conquistadores* made of treasures stowed away by old Aztec and other Indian monarchs. But, though long cele-

brated as the "Land of Gold," Mexico has not shown any great extent of territory which may properly be called auriferous, and undoubtedly her greatest mineral wealth lies in the vast deposits of silver.

Coal is found in limited quantity, and very little of that of good quality. Recently the information came from Jimulas (a small station on the Mexican Central railroad, about 500 miles south of El Paso) that bituminous coal of good quality had been found. As may be imagined, the news created great excitement, for, if true, the importance of the discovery to the mining interests of Mexico can scarcely be computed. The dreams of thousands of prospectors, who for many years have been tramping the mountains and valleys of this land of promise, have all hinged upon the finding of coal; but hitherto no sign of "black diamonds" worth working has been discovered.

Within the introduction of coal the entire mining industry of Mexico would undergo a revolution, for without it thousands of claims are rendered valueless by reason of the high price and scarcity of fuel needed to work them; and with it unnumbered low-grade mines would be brought within paying limits. Meteoric iron is found in several of the Mexican States, and in one of them there is a huge conical hill composed entirely of magnetic iron ore, which the native blacksmiths manufacture directly into wrought iron, with no other apparatus than their common forges.

Mexico lost most of her quicksilver when we became possessed of Upper California, for that section (now belonging to the United States) produces more than half of the quicksilver supply of the entire world.

The ancient Aztecs made most of their tools of copper, hardened by an admixture of tin. But their most important article was obsidian—a species of volcanic glass, melt-d in the furnaces of Popocatepetl, Orizaba and Ixtacchuatl. Extensive mines of it, evidently of great age, are found in several localities, and near them are scattered hundreds of tons of fragments. Prescott describes the Aztec warriors in battle array "with spears tipped with volcanic glass, which glittered in the sunshine," and the sanguinary priests made knives of the same substance, with which they dug out the living hearts of human victims to offer to their gods. Scattered all over the plains and foot-hills, but more especially in the Valley of Anahuac, in the vicinity of the modern capital—which occupies the site of the Aztec Tenochtitlan—may be found thousands of knives, arrow-heads and spear-points, showing how numerous were the uses to which obsidian was put.

Among the precious stones of Mexico are rubies, garnets, emeralds, topaz, amethyst, opals, cornelians, agates, caruncles, tritomite, silicates, analcime, apophyllite, stilbite, a few diamonds (about equal to ours of Lake George and Alaska), and the beautiful pearls of the southern fisheries. Since the somewhat fussy queen of England has lately been exerting herself to render opals more fashionable than diamonds we may look for a revival of the opal trade. One of the richest opaliferous districts in the world is Queretaro, near which city is a famous building whose partition walls are built entirely of opals. The celebrated "Simpatia" mine is most noted for its great variety of opals, it being a magazine of varieties, including what are known as "fire" opals, "simulopals," "precious" opals, etc. The gems are found in a porphyry matrix of reddish gray color, disseminated without apparent system, and are obtained by sinking shafts and boring with large augers. One of the finest black opals ever known came from this mine, and is now in the possession of Mr. Charles A. Dana, of New York. No words can describe the beauty of the polished stones. Some of them are as transparent as a drop of water, but showing all the colors of the rainbow in occasional flashes; others are pale yellow with blue and green lights hidden in their translucent hearts, and others are of the milk-white variety, with which we are more familiar, containing wonderful "fires."

A column might be written on the rocks, slates and marbles, porphyry, basalt, granite, onyx, alabaster, etc., with which the country abounds. The celebrated "Mountain of Marble," near Puebla, is worthy to be classed among the wonders of the world. It is the beautiful onyx whose fame is worldwide, and it is found all around the "City of the Angels," as Puebla is called because of a tradition that the heavenly hosts came down by night and assisted in building the big cathedral. The rarer and more highly colored pieces are deeply imbedded in quartz, and are extremely difficult to get at. So translucent is some of it—streaked with pale green, pink and yellow, shading from dead white to mahogany brown—that thin slabs of it are used instead of glass in the windows of a little church erected near the quarries for the Catholic workmen, and the softened light admitted through the alabaster is something too lovely for description. The famous altar in the cathedral, within which the bishops are buried, is composed entirely of this material—steps, floor, dome and pillars—and the Taj Mahal, of India, cannot be more beautiful.

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An Experiment in a Charcoal Pit.

Few days ago an interesting experiment took place at a charcoal pit five miles from town. It appears that the men at the pit were greatly blamed by their contractor for alleged carelessness in their work. He claimed that the returns of charcoal were insufficient for the amount of wood consumed, because of some waste in the burning. In order to show the fallacy of this claim, the men selected a new pit, placed one dozen silk handkerchiefs at the bottom of it, and carefully piled on top of them 16 cords of wood. A fire was started and the wood burned. Upon the coal being removed, the handkerchiefs were taken out and found to be wholly free from injury. The result of the experiment so surprised the contractor that he immediately apologized to the men, and advanced their contract price to one-half per cent. a bushel more than the contract calls for. In this connection it is interesting to note that over 80,000 bushels of charcoal are turned out in the pits here every year. The Buttes Company alone utilizes 20,000 bushels.—*Sierra Tribune*.

How He Found a Mine.

Some of the best mines known have been discovered as before remarked, merely by accident, while others again are the result of years of toil and labor. Then others again have been run across when the lucky individual, whose fortune favored, was thinking anything but falling into a gold mine. John Quincy Adams, a namesake of the great John Q., struck a rich mine somewhere down in New Mexico in this way: While prospecting he found his haversack on fire, his prospectors' glass having focused the sun's rays upon it. As the haversack contained about a dozen pounds of powder he dropped it and got out of the way in a hurry. It fell into a crevice and a large mass of rock was thrown up. Adams returned mournfully to gather up what might be left of his effects, and saw an exceedingly rich vein of ore which the explosion had exposed to view. He sold a third-interest in his find for \$16,000, and very consistently named the mine "The Nick of Time."

A Geological Rarity.

During a recent visit of the members of the Liverpool science club to the Lea Green collieries, on the west boundary of the Lancashire coalfield, on descending the shaft and traveling a little way along the dip head, they came to what to the geologist was a most interesting feature, called technically by the miners a "squeeze," which consisted in this case of a mass of sandstone 64 yards wide running through the coal seam, locally accounted for, as the name implies, by the mass of rock having been pushed up through the overlying strata. Science, however, knows nothing of such cataclysms as these, and accounts for the "squeeze" as having been the bed of a river flowing through the primeval forest of the era geologically known as the carboniferous period. In the soil layer underlying the "squeeze" numerous silicious diatoms and minute scales of ganoid fishes were found by microscopic investigation.—*English Labor Tribune*.

The Treadwell Mine.

In an official report of the mining resources of Alaska, H. Schwatka gives the following interesting information in relation to the Treadwell mine, on Douglas Island: "This mine is fully 600 feet in width and of unknown length and depth. As one person laconically put it, they not only own a good ledge, but a stone quarry that is rich in gold. The quartz is of a low grade, as miners say; that is, there is but little gold in it to the ton, but is of a free-milling quality; that is, it is easily crushed and the little gold readily secured at small expense. From one of the gentlemen connected with the mine, and whom I of course considered the most reliable of all, I ascertained that the quartz usually runs a little over \$5 to the ton, but had been running a little less than this recently; that the monthly run was about \$30,000, with an expense of about two thirds of that sum."

In the course of a discussion this morning between miners, on the speed with which a miners' cage can be hoisted and lowered in a shaft, one of them said that the fastest time ever made in lowering was in the Union shaft. A cage with men was reaped from the surface to the 2900 level in one minute and 12 seconds. This was at the speed of a little more than 40 feet in a second, and slightly less than 30 miles an hour. On another occasion, when a shaft was flooded through the breaking of a pump, 63 tanks of water were raised to the surface from the 1300 level in the space of an hour. During this time it was necessary for the cable in ascending and descending to travel 2600 feet in less than one minute, making a total of nearly 32 miles traveled in the hour.—*Virginia Chronicle*.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We therefore request that when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

PRACTICAL AND THEORETICAL MINING.

QUESTIONS AND ANSWERS PREPARED WITH A VIEW
TO ASSIST APPLICANTS IN

Obtaining Certificates of Competency for the Positions
of Fire Boss, Mine Boss, Mine Inspector,
Etc., Etc., Etc.

BY ROBERT MAUCLINE, EX-INSPECTOR OF MINES

Entered according to Act of Congress in the year 1885, by J. S.
Kirkwood & Co., in the office of the Librarian of
Congress, at Washington, D. C.
POWER OF MACHINERY.

Ques. 62.—How do you find the horse power of a
steam engine?

Answer.—The following formula is generally used
to find the power:

$$\frac{A \cdot P \cdot S \cdot 2 \cdot R}{33,000} = H \cdot P$$

Where A = area of piston in square inches.

" P = average pressure per square inch.

" S = length of stroke in feet.

" R = revolutions per minute.

" H P = horse power.

Which means: Square the diameter of the cylinder
in inches, multiply it by .7854 which gives the area,
this multiplied by the pressure per square inch gives
the total pressure or load upon the piston, this multi-
plied by twice the length of stroke gives the distance
in feet which the piston travels with the load
each revolution, and this again multiplied by the
number of revolutions per minute gives the total
distance in feet traveled by the piston with the load
in one minute, which result is the foot pounds or
units of work, and this divided by 33,000 reduces it
to horse power, the same as reducing pounds to
tons.

Ques. 63.—What is the available power of a pair
of hoisting engines with 24 inch cylinder, 5 feet
stroke, making 40 revolutions per minute, the
gauges at the boilers indicating a pressure of 75
pounds?

Ans.—Assuming $\frac{1}{2}$ of the pressure to be spent on
overcoming friction, and in the difference of pressure
between the boilers and the pistons would
leave an effective average pressure of 50 pounds.
Then

$$24^2 \times .7854 = 352.3904$$

square inch as the area of the piston.

$$\frac{352.40 \times 50 \times 5 \times 2 \times 40}{33,000} = 213.5 = H. P.$$

as the power of one engine, and

$$213.5 \times 2 = 427.0 \text{ H. P.}$$

as the power of the pair at that speed and pressure.

Ques. 64.—What type of engines would you prefer
for hoisting at collieries?

Ans.—Would prefer high pressure horizontal double
first motion engines with balance cranks,
and where the depth was over 500 feet, would prefer
conical drums and have the engines fitted with
balance valves worked by drag cranks from the
main crank pins. The cylinder to be of such size as
develop the required power, at not more than 500
feet of piston speed per minute.

Ques. 65.—A shaft is 1600 feet deep, the ropes are
steel $\frac{1}{2}$ inches diameter, the cages are
double decked, built of steel and weigh 1½ tons. The
empty cars weigh (1) one ton each, and carry 3 tons
of coal. The engines are first motion with cone
drum, the small diameter of the cone is 14 feet.
What should be the large diameter?

Ans.—In order to solve this problem we must
first find the weight of the rope. A steel rope $\frac{1}{2}$
inches diameter, with wire centre, will weigh about
5.66 pounds per foot.

$$\frac{5.66 \times 1600}{2000} = 4.5 \text{ tons nearly.}$$

Therefore the load to be started by the engines will
be about as follows:

Weight of 2 car loads of coal	6	tons.
" 2 cars	2	"
" cage	1½	"
" rope	4½	"
Total load	14	"

When the load reaches the top it has lost the
weight of the rope and is only

$$14 - 4.5 = 9.5 \text{ tons.}$$

Then, if the engine can lift 14 tons on a 14 feet
lever, it will lift 9½ tons on a 20.7 feet lever, because

$$\frac{14 \times 14}{9.5} = 20.68 + \text{feet;}$$

therefore the large end of the cone should be 20 feet
8 + inches, if we neglect the balance from the other
rope. Let us now examine the effect of the rope,
cage and empty cars on the other side. At the lift
we have 14 tons on a 14 feet diameter, and a back
balance of 3½ tons on a 20.68 feet diameter, 3½
on 20.68 is equal to 5.17 on 14, because

$$\frac{3.5 \times 20.68}{14} = 5.17$$

and

$$14 - 5.17 = 8.83$$

as the unbalanced load at the lift.

When the back balance reaches the bottom it is
8 tons on a 14 feet diameter, and 8 on 14 is equal to
5.41 or 20.68, because

$$\frac{8 \times 14}{20.68} = 5.41$$

and the load at top of

$$9.5 - 5.41 = 4.09$$

as the unbalanced load at the top.

But an unbalanced load of 8.83 on a 14 feet drum,
would be equal to 5.97 tons on a 20.68 feet drum, and
the actual unbalanced load being only 4.09 tons, we
at once see that the large diameter should be more
than 20.68 feet to be theoretically correct.

The following formula is given to solve the problem:

$$D = \frac{d \times (W + 2 \times C + 2 \cdot R)}{W + 2 \times C}$$

Where W = weight of coal in cars.

" C = " cage and cars.

" R = " rope.

" d = small diameter of cone.

" D = greatest " "

Applying this to our proposition we obtain

$$\frac{14 \times (6 + 2 \times 3.5 + 2 \times 4.5)}{W + 2 \times 3.5} = 23.7$$

feet as the large diameter.

Proving this by the same method we have the
following result:

A load of 3½ tons on a 23.7 diameter is equal to 5.92
on a 14 feet diameter, and

$$14 - 5.92 = 8.08$$

as the unbalanced load at the lift.

When the back balance reaches the bottom it is 8
tons on a 14 feet diameter, and 14 on 8 is equal to
4.72 on a 23.7 feet diameter, because

$$\frac{8 \times 14}{23.7} = 4.72,$$

and the load at the top of

$$9.5 - 4.72 = 4.78$$

as the unbalanced load at top.

Then an unbalanced load of 8.08 on a 14 feet
drum, is equal to an unbalanced load of 4.77 on a
23.7 feet drum, because

$$\frac{8.08 \times 14}{23.7} = 4.77$$

which is the same as found above within $\frac{1}{10}$ due to
the fractions not being carried out to five places.

The above proves the formula to be correct, and
the required diameter to answer the question is 23.7
or 23 feet and about 8½ inches.

The small end of the cone may be considered a
lever, which is acted upon by both the load and the
back balance alternately when at the bottom, and
the large end is a lever acted upon by both the load
and the balance, when at the top. Therefore the
diameters should be inversely proportionally to the
sum of the loads which act on each respectively.
The sum of the load and balance which act on the
small diameter is equal to

$$W + C + R, \text{ and } C + R.$$

The sum of the weights which act on the large end
of the cone is equal to

$$W + C \text{ and } C.$$

The largest weight into the shortest lever is equal to
the smallest weight into the longest lever, therefore,

$$W + C + R + C + R \times 14 = W + C + C \times 23.7$$

which is the same as the formula given:

$$\frac{d \times (W + 2 \times C + 2 \times R)}{W + 2 \times C} = D$$

When the large end is given the small end is found by

$$\frac{D \times (W + 2 \times C)}{W + 2 \times C + 2 \times R} = d.$$

(To be Continued.)

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of \$5.

LABOR TOPICS.

Some very large steam engines are being made,
One New Hampshire firm has just put in one 1000-
horse-power engine.

The Rochester tumbler company, of Pennsylvania,
offers \$4000 in prizes to its employees for the best
work during the coming year.

New York and Pennsylvania capitalists are buying
up 3000 acres of land in Jefferson county, Pa.,
for the purpose of operating on it a large scale.

Copper tube manufacturers will be interested to
know that there is a new process just patented in
Birmingham, England, for making seamless copper
tubes.

German industries of all kinds are prospering out
of proportion to comparative countries. The cloak
manufacturers have placed enormous orders for cloth
in Berlin, and prices for material are 20 per cent.
higher than last year.

British capital in the valley of Mexico has started
to use peat in the manufacture of brick by machin-
ery, the peat to be supplied at 60 per cent. less than
the present price of wood. Large beds of alleged
anthracite coal in that locality will be worked
shortly.

The leading authority in New York says that
there is a general expectation that the revival of
trade will be distinctly marked through the coming
autumn and winter. Mechanics and workmen
take great comfort from these statements, because
heretofore they have used up in winter what they
saved in summer.

Employers are pleased with the attitude taken by
Mr. Powderly on the eight-hour question. They
have been apprehensive that agitation will be re-
newed next year. There is a strong sentiment
among the Knights of Labor in favor of it. Strong
combinations have been effected among the manu-
facturers to fight the movement in organized form
when it comes.

Homes for the Workingmen.

Anarchy, socialism and communism are rarely
advocated by persons with comfortable homes of
their own, with pleasant surroundings. The an-
archist is a man without a home, and who imagines
that the only way to build up is by tearing down.
The socialist and communist are men who are
thinking far ahead of the times they live in. They are
anxious for a better state of things for all mankind.
They are losing present opportunities by grasping
at future possibilities. The world is pro-
gressing rapidly, and the wise man will
progress and grow with it, making the most of
everything. With this in view, let us work the
shortest possible number of hours that will produce
for us the comforts we ought to have. But don't let
us, in our struggle, forget that the manufacturer is
the same kind of being that we are. He may like
work better than we do. For the fact that
he is forerhand proves that he has worked harder
and been more ambitious. Property cannot
be acquired without either labor of the hands
or brain. While we are wasting time in agitation,
the manufacturer keeps right on with his business,
naturally becoming richer. The most profitable
organization for the laboring man is a building as-
sociation, which will enable him to get a home of
his own much sooner than he could without the
assistance of such organization. When he has a
good home and a good position, he dwells in the
real sphere of life and takes seed and comfort as
the sower sows. He shuns the society of the vision-
ary schemers who are seeking to bring about in a day
what should take a century. In all places where the
laboring man owns his home, peace and contentment
reign. This trait stands out very prominent in the
city of Philadelphia and the town of Rockville,
Conn., and in many other places we might name.
Wherever we find a "city of homes," whether in
Europe or America, it will be found that the capital-
ists, so-called, largely come from the ranks of la-
bor.—[Wade's Fibre and Fabric.

In a recent article in the *Forum*, Dr. Charles L.
Dana places the value of an adult life to the state at
least \$750, and its annual productive power at
\$95. One-half of all the deaths occur during the
productive age, so that two hundred thousand
deaths at this period, which occur annually in the
United States, represent an enormous loss to the
country. He also calculates that every death repre-
sents about two years of sickness, and that there are
in this country about a million and a half persons
sick all the time. In England and Wales it has
been found that every workman averages a week
and a half of sickness in the year. It is estimated
that the wage-loss from sickness in France is \$70-
000,000 each year, and from death \$180,000,000.

Mr. Andre, of the London *Colliery Guardian*, is
always startling us with some new thing or other.
His latest is that coalmining is not a more danger-
ous occupation than many others, and this is shown
by statistics just published in Germany, in accord-
ance with the new law concerning employers' li-
ability. These statistics (he says) cover the period
of eight months from October 1st, '85. In that period
the number of accidents in the whole of the German
empire was 14,081, or 404 per thousand workmen.



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FOR THE WEEK ENDING

SATURDAY, OCTOBER 23, 1886.

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BUSINESS PROSPECTS.

A temporary falling off in the movement of merchandise is the only unfavorable symptom in the present business situation, and this is offset by a satisfactory explanation and the settlement of several labor disputes which threatened seriously to disturb the very generally satisfactory condition of present trade and future prospects. The decrease in the movement of merchandise is due to natural causes, and is generally regarded as being only temporary. Recent distributions have been on an enormous scale, and the result is that, despite the largely increased consumption, merchants have been supplied. The weather, also, has been unseasonably warm thus far, and the strikes in the west and other sections have had an unfavorable effect on trade. During the present week, however, several strikes have been settled, notably that of the Chicago pork packers, and the outlook for the future is brighter therefor. The packers, by direction of the Knights of Labor, accepted the terms of the companies and resumed work at ten-hours a day; and several of the firms subsequently advanced the rates of wages. This latter action being purely voluntary on the part of the employers, gives assurance of a re-establishing of a friendly feeling between the employers and employees. The order of the head of the Knights of Labor to the strikers, directing them to resume work, was a mandatory edict, neither explaining why the strike should be abandoned nor indicating the future course of the organization relating to the issue involved. The solution of the difficulty, however, appears to be quite satisfactory to those most directly interested and is encouraging to the general business interests of the country.

There is danger at present that the National banks may, by surrendering large amounts of their circulation, so contract the currency as to cause a shrinkage in values and arrest the progress of industrial revival. The banks have it in their power to do this, and the calling in of the three per cent. bonds, upon which a large proportion of the bank circulation is based, would to their satisfaction justify such action. They might also profit by it, as they have profited by like enterprises in the past. Under existing circumstances the banks holding three per cent. bonds are compelled to either present them for redemption as they are called or have interest upon them stopped. If they present the bonds they must either go into the market and purchase four or four-and-a-half per cents. or else surrender their circulation. Should any number of them act together and conclude to present their bonds for redemption and retire their circulation, the business of the country would soon feel the shock of currency contraction, since no provision for supplying currency to take the place of such retired bank notes is now made. It, therefore, becomes the duty of congress at its next session not only to provide for supplying such deficiency as may be caused by the retirement of bank notes on this account, but to enact a law authorizing an issue of government notes to take the place of all National bank circulation. The public debt is properly and promptly being wiped out. It is the basis of the bank circulation and the latter cannot be perpetuated after the former has ceased to exist.

The Northwestern railroad pool has helped the stock market somewhat the past few weeks, but the switchmen's strike at Minneapolis and St. Paul, has been a retarding influence. The cause or causes of the trouble at these points are a little obscure, but there is a general belief that a speedy adjustment will be effected. The Chicago strike has also had a retarding influence on the business of the railroads, as is shown by reports of recent earnings, and it is said that nearly all the lines are shipping at 20 to 22 cents, instead of at 25 cents as agreed. A meeting was to have been held this week for the purpose of considering the matter. Very little progress has been made during the past week in the matter of reorganizing the Reading road, and unfavorable reports of the condition of Jersey Central's finances have resulted in a decline in the value of stocks.

A remarkable improvement is noticeable in the iron trade in all sections of the country, as has been heretofore stated. It is regarded as remarkable that the price of pig iron should advance at the close of a year in which there was an increase of nearly a million tons in production. Evidence has not been wanting during the past three months that if there was any disposition on the part of the trade to encourage a boom in prices, it might readily be accomplished, but the

disposition of the trade has been exactly the opposite. All the advance that has been made has come legitimately and so gradually that many firms have not yet officially advanced prices, although they have no iron to sell at the old figures. The improvement in trade extends to manufactured iron and is felt in every branch of the iron industry, and also in the industries dependent upon it.

The anthracite coal trade continues active, with production at its height and no stocks accumulating. Prices were not advanced as was expected at the meeting of companies in New York, but an advance of from ten to twenty-five cents per ton will be made on November 1. Meantime the combination seems to possess little fear of the result of Attorney General Cassidy's suits against them. They seem to understand the matter as the public does—in the light of a political manoeuvre. The governor and attorney general, however, declare their intention of pressing the suits to a speedy termination, and in the interest of everybody concerned it is to be hoped they will do so. The bituminous coal trade is still active, with the output increasing. Prices, however, remain about the same, and there is very little profit in the trade except to the carrying companies, which are all supplied to their fullest capacity.

ABOUT APPRENTICESHIPS.

Among the many vicious features of modern trade-unions, one of the worst and most indefensible is the apprentice system, by which the unions limit the number of apprentices in the various trades. A case in example is that of the New York plumbers, who are now out on a strike in the attempt to force this point upon the employers. But some of the trade-unions go further and insist that no apprentices shall be taken—that is, until the number of workmen in the special trade concerned shall have become largely reduced by death and other causes. At the convention of glass blowers held at Atlantic City, N. J., some time since, a resolution was adopted abolishing the apprentice system in glass factories. Commenting upon this, the *Textile Record* says: "The matter, of itself, is perhaps of small importance, but it is significant of the tendency of the labor movement, and it has an interest beyond the narrow boundaries of the glass industry, because similar action has already been taken by other trades. The point involved is just this: Men who are earning their bread at skilled labor formally declare that no American boy shall be allowed to acquire the skill required to perform that labor. They turn their backs on five or six million young men and boys in this country, and deny their right to become expert mechanics. The purpose, of course, is to make skilled labor scarce and so to keep up wages. The result is to exclude the young from the chance to earn good wages, to force many of them into idleness and to tempt others into crime. Against such a system the people of the country have a right to make vigorous protest. It is a matter that affects society at large. It touches directly every man who has children, and indirectly every human being, from the lowest to the highest. The right of a boy to learn any honest trade that he wants to learn is positively indisputable; and to this is joined the clear right of every employer to take a boy into his shop to help him to acquire knowledge and skill. The denial of these rights by a trade-union is tyranny and it ought to be resisted to the last extremity."

We have frequently written in favor of the formation of mechanics' and engineers' clubs for the purpose of mutual improvement. Such clubs have a number of instances being formed, and some of them are doing excellent work. Others we are sorry to say, have been broken up or crippled by foolish internal dissensions. As such clubs increase in membership and importance, it is necessary to establish rules for government, and right here is where the trouble begins. The members do not understand the importance of yielding to the will of the majority. It is a fact, and it is not creditable, that when mechanics or engineers unite for the most praiseworthy purposes, the last thing they learn is that the majority must rule, and that the minority should submit, so long as no question of absolute right or wrong is involved. Very frequently they never learn this, and associations that might do much good go to pieces in consequence.

THE COAL TRADE in the Gulf of Aspinwall amounts to \$4,000,000 per year, the bulk of which is controlled by Great Britain. The British mines

have been worked to great depths, in very many instances; yet she elevates the coal from mines a mile deep, puts it on cars and thus transports it 200 miles to vessels on which it is loaded and then carried 5,000 miles, and furnished at a cost of less than \$7.50 per ton. The pauperization of English labor has, of course, much to do with this cheapening of fuel, yet not all. There is an economy in mine management, and a respect for public rights and regard for home interests on the part of common carrier that have an important bearing on the case as well.

THE Scranton *Truth's* relief fund, for the benefit of the widows and orphans of the Marvine disaster, already amounts to over \$1,100. The *Truth* should feel proud, and the widows and orphans have reason to feel grateful.

PUBLIC opinion has now settled down to the conclusion that Gov. Pattison's attack on the coal pool was a political piece of clap-trap and nothing else.

THERE is an improved and active demand for bituminous coal, but it is not reflected in an advance in quotations.

IMPROVEMENTS.

A new pump is being put in at the colliery of the Wm. Penn coal company at Wm. Penn, Schuylkill county, Pa.

Work on the Silver Brook branch railroad in Schuylkill county, Pa., is completed. As soon as the rails are laid the breaker at that point can commence shipping coal.

The work of rebuilding No. 1 breaker of Carter & Co. at Coleraine, Carbon county, Pa., is completed excepting one side. Coal is being prepared with the other for furnace purposes, and a large number of the employees who have been idle for several months have been given employment.

The work of clearing out the slope at Gilberton colliery, Schuylkill county, Pa., which was cut in about three weeks ago, is progressing very rapidly, and it is thought the colliery will be able to again resume operations by November 1st. It is to be hoped so, as during its enforced idleness the four thousand men and boys who find employment there, have been thrown entirely out of work.

The repairs at Park No. 1 (Bowman's) colliery near Mahanoy City, Pa., have been so extensive that nearly the whole place has been rebuilt. The engine and boiler houses at the head of the shaft have been rebuilt and two new trestles from the shaft to the breaker and the new dirt plane, 150 feet high, have been erected. New machinery has been put in the breaker which with other improvements cost about \$75,000.

The Nelsonville coal and coke company, of Columbus, O., whose works are at Happy Hollow, in the Hocking valley, have just completed machinery for washing their slack, and are now ready to make a good coke. This is the only coke works in the Hocking valley, but owing to the impurities in the slack used in coke making, the coke has not been a good fuel. With the new machinery the quality of product will be greatly improved.

MINING NEWS.

The shipments from the mines of the Cumberland region, Maryland, for the year ending last week, were 1,679,465 tons, a decrease of 330,387 tons as compared with the shipments of 1885.

There has been discovered in McHenry township, Lycoming county, Pa., a large deposit of yellow ochre—a four foot vein covering a great deal of ground. Also a white material from which it is believed paint can be made. There is also coal on these lands.

The East Tennessee, Virginia and Georgia railroad has leased 350 coal cars (gondolas), and has numbered them in a series between 30,001 and 40,000. The road has also built 200 new ones at the shops in Knoxville, Tenn. This gives a total of 550 new coal cars. They are of 50,000 pounds capacity each.

During Governor Pattison's visit to Philadelphia last week he had frequent conferences with Attorney General Cassidy, and it was definitely resolved to bring the suits against the corporations composing the coal combination and the trunk line pool this week. Mr. Cassidy wants to push the suits with all possible speed to get them on before Gov. Pattison's term expires.

The dispute between the coalmasters of Fife and Clackmannan, in Scotland, and their men is approaching a crisis. The notices threatening to charge the men with loss and damage sustained by their abstention from work in the carrying out of their resolution to restrict the days of labor to five per week have had no effect, and the Masters' Association met yesterday and agreed to issue summonses, bringing actions in which the leaders of the movement will be charged with loss and damage.

WOMEN AT COKE WORKS.

The Report of a State Official on the Connellsville Coke Region and the Monongahela Valley Coal Field.

Hon. J. B. McCamant, chief of the Bureau of Statistics, has made an interesting report under the head of "The Bituminous Coal Region." Although the output of coal and coke last year reached nearly 25,000,000 tons, he says: When the vast area of bituminous coal territory is taken into consideration, in connection with the number and richness of the coal strata, the facilities for mining, the ready means for transportation, with a constantly increasing business demand, the trade in these products may be considered in its infancy. There was a falling off in the past year in the production of coke of about 414,768 tons. This resulted from a combination among the operators to restrict the production to the demands of trade, as well as by reason of the labor troubles which culminated in disastrous strikes in the Connellsville coke region. Connellsville, as the leading point in the coke production of Pennsylvania, has not been over-estimated. The unfavorable criticism it has received by reason of the employment of women about the coke ovens is not altogether unwarranted, although the facts have not been generally known. That women have been permitted to perform the severe manual labor generally apportioned to men is true. It is not true, so far as I could learn, that such labor was employed by the owners and superintendents of the coke ovens, but it is a fact that such employment was with their knowledge, and without their expressed disapproval.

Men are employed and paid by the oven, and a number of the men so employed were Hungarians, whose sturdy wives, in their native land, were accustomed to out-door labor. Naturally to them, most unnaturally to the American view, they assisted their husbands in this country in preparing the ovens, and in drawing the coke therefrom. The work done being piece-work, the owner was disposed to be satisfied without inquiring too closely into the manner of its accomplishment. The coke owners did not directly hire the women, but must have been cognizant of the fact that they would assist those with whom they did directly contract. Knowing, too, that the labor was not new or unusual to the woman no doubt tended to reconcile the employers to their performing it. While the employment of women in the outdoor manual labor usually performed by men, is contrary to the habits and customs of our people, and even though, as in the case referred to, the women themselves did not object, and were not actually injured, nevertheless such avocation for them must encounter a just prejudice. There is a feeling that the field of action for women in this country should be enlarged, and the doorway to honorable professions and pursuits should not be closed against them for the sole reason of their womanhood, but the chivalrous sense of the nation revolts at their employment in rough outdoor labor, however, coarsely they may have been nurtured. Practically, such employment places the native workmen at a disadvantage. Such competition would eventually compel our more delicately reared and refined women to follow the example of their more stalwart Hungarian sisters, or leave such fields of labor to more ignorant competitors. The last would inevitably be the result; the great body of our workmen would endure great suffering and privation rather than permit their wives and daughters to enter into a competition so foreign to our general policy, and in opposition to the physical and mental training of women. The exemption of women from out-door, coarse, manual labor is fully recognized for many reasons, and has been followed by the enactment of a general law by the legislature forbidding their employment in and about collieries and coke ovens.

Closely relating to the hiring of women for unnatural work is the employment of boys in and about the mines and coke ovens. The labor to be performed by them is not so heavy, nor is such employment so contrary to our modes of thought and natural customs. In truth, the refusal to permit such labor is frequently regarded as an infringement of personal liberty of action. The selfish instinct of the hard working, uneducated labor is appealed to, and he regards as a great hardship a law which prevents him from availing himself of the assistance that could be rendered by a sturdy, healthy boy. While the physical growth of the lad would not be impeded or even impaired by such employment, his mental culture would be entirely neglected. The employment of boys of tender years at protracted and continuous labor is against the genius and spirit of the age, which, in the universal establishment of public schools, demands the general education of the masses of the people. Therefore, the law of June 30th, 1885, prohibiting the employment of boys under the age of 14 years in or about mines, which include coke ovens, has met with general approval.

At the time of visiting Connellsville, December 24, '85, the coke ovens were in full operation, and,

according to the best information attainable, fully ninety per cent. of them were lighted. No women were to be seen at work about the ovens, and I was reliably informed that the custom had fallen into disuse. I was also fully convinced that the law in relation to the employment of young boys was being observed. I was unfavorably impressed with my visit through the coal region from Brownsville to Pittsburg, which took me through the portion of the country on the Monongahela river at the time the strikes of the coal miners were in operation. It is possible that the existence of such strikes were so demoralizing in its effect as to cast a gloom on all the surroundings. The country is mountainous, and in the desolation of the depth of winter the rude home of the miners looked cheerless and uncomfortable. There did not appear to be any gardens around the houses, and outside the towns and villages, but little evidence was to be seen of advanced civilization in the manner of living. I could not help contrasting this region with other localities that I have visited. It may have been that the season of the year, in connection with the pending strike, created an impression that marred the face of nature, nevertheless squalor and poverty seemed to reign supreme. Whether this was the fault of employer or employed, or both, I am unable to say, but it is certainly to be hoped that a condition more favorable to the physical, intellectual and christian development of the workman may be brought about in the near future. There were 476 mines operated in '85, employing 44,000 men, to whom were paid for wages \$14,240,775. It is a noticeable fact that during the preceding year, '84, there were but 361 mines employing 38,306 men, yet these men drew \$14,752,786, or over half a million more than the 44,000 men did in '85. This is accounted for in the fact that the mines ran but 185 days in '85 as against 213 in '84. Strikes are costly things for labor as well as capital. The number of tons of coal mined was 20,647,720, an increase as compared with the previous year of 2,582,779 tons. The number of coke ovens in operation at the close of the year was 5,457, a decrease of 2,486. The number of idle ovens was 5,378. The number of days represents the time actually employed by the majority of the employees. About one-third of the employees averaged about 160 days only. The annual wage fund, if divided share and share alike among all the employees, and would give to each about \$823 per annum, or \$27 per month. The highest average wages paid miners was \$3 per day. The average wages paid miners was \$1.70 per day. The highest average wages paid to common laborers was \$1.60 per day. The average wages paid to same was \$1.40 per day. Boys received about 60 cents per day.

HAYES' SQUIBS.

Their Merits Call for Another Factory to Supply the Demand.

The one great desideratum in the perilous life of a miner is a safe and reliable fuse or squib for the setting off of his blasts. Of all the mine casualties of the coal region, the greatest percentage and usually the most fatal are those which flow from premature blasts, or the "hanging fire" of a squib in a charged hole. Various patents have been taken out for the manufacture of a squib that can be depended on to do its duty, and to insure the safety of the collier, but only in rare instances have they stood the test. Changes of weather, atmospheric influence, mine dampness or dryness, with various other causes, have acted on them to their detriment and the users have suffered. One exception to the rule has been the "Hayes squib," manufactured by George Hayes, at Girardville. It is the outcome of a practical miner's careful study and most exacting experiments, resulting in the production of an article that comes as near perfection as it is possible to do. It has been received with so much favor that for months past the manufacturer's resources have been overtaxed to supply the demand. Mr. Hayes gives his own personal supervision to the making of the squibs, and to this fact is due the measure of reliability they have gained. So long as he is able to do this he fears no failure in their service. In his Girardville factory a large number of workers are employed, yet they cannot keep up with the market calls. To remedy this Mr. Hayes is about to open a branch factory at St. Clair, fitting it out in every respect co-equal with his present place, and guaranteeing the same excellence in its products. The success he has gained in his business has been well earned by Mr. Hayes and the HERALD congratulates him on his enjoyment.

Lard and grease have, as is well known, a corrosive action on brass and copper, and this is a drawback to their use as lubricants for these materials. It has been pointed out that, while both melted India rubber and vaseline are without corrosive action on brass, each alone has a disadvantage. Thus melted India rubber is too glutinous, and in course of time hardens. Vaseline never hardens, but is deficient in tenacity and adhesiveness. A mixture of both substances is therefore recommended, consisting of one part by weight of melted India rubber and two parts of vaseline. The rubber should be pure, not vulcanized, and cut into shreds, then melted at the lowest possible temperature in an iron cup while being pressed down against the hot cup and stirred into a uniform glutinous mass. The vaseline of a common thick brown sort should be added to the India rubber, and the whole thoroughly stirred and blended together.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—Please publish the following answers to the questions asked by "A Learner":

Question 1.—The total rubbing surface of a circular shaft is 15,708 feet; the shaft is 500 feet in depth and the velocity of the air current in the shaft 8 feet per second. What is the total amount of air passing through the shaft per minute?

Answer.—If we divide the rubbing surface by the depth (500) we will get the circumference of the shaft

$$15,708 \div 500 = 31.416$$

circumference of the shaft, then divide the circumference by 3.1416 we will get the diameter.

$$31.416 \div 3.1416 = 10 \text{ feet}$$

diameter; if now square the diameter and multiply by .7854 we will get the area

$$10 \times 10 = 100 \times .7854 = 78.54$$

area of the shaft; area multiplied by the velocity per minute equal quantity per minute.

$$8 \times 60 = 480$$

velocity per minute.

$$78.54 \times 480 = 37699.2$$

total amount of air passing through the shaft per minute.

Ques. 2.—If 8,100 cubic feet of air passes through a square airway 81 feet area, what quantity will pass through a square airway 32.5 feet area, the pressure being the same in each case?

Ans.—Quantity divided by the area will equal velocity

$$8100 \div 81 = 100 \text{ velocity;}$$

the square root of the area multiplied by four equal perimeter

$$\sqrt{81} = 9 \times 4 = 36 \text{ feet perimeter.}$$

If we divide the area by the perimeter, the square root of the results will be the relative velocity.

$$81 \div 36 = 2.25 \text{ and } \sqrt{2.25} = 1.5$$

relative velocity in the airway 81 feet area. We will now find the relative velocity in the airway 32.5 feet area:

$$\sqrt{32.5} = 5.70087 \times 4 = 22.80348 \text{ perimeter,}$$

$$32.5 \div 22.80348 = 1.42522 \text{ and } \sqrt{1.42522} = 1.19382 \text{ relative velocity.}$$

$$\text{Then as } 1.5 : 100 :: 1.19382 : 79.52133$$

velocity in the airway 32.5 feet area.

$$32.5 \text{ area} \times 79.52133 \text{ velocity} = 2584.443$$

quantity that will pass through the airway 32.5 feet area.

$$\frac{v}{1,000} = \frac{v^2 \times s}{81} \times \frac{k}{.0217} = .000096 \text{ pressure on the large airway.}$$

$$\frac{v}{79.52133} = \frac{v^2 \times s}{32.5} \times \frac{k}{.0217} = .000096$$

pressure on the small airway. Respectfully,

Wilkes-Barre, Oct. 16, 1886.

K. G.

Diameter of Pumps, Etc.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following answers to "J. H. D.":

1. What diameter of pumps will an 85 in. cylinder engine work from a depth of 120 fathoms, at a steam pressure of 15 lb. to the square inch? Two sets of pumps 26 in. diameter?

2. How many imperial gallons per minute of feed-water would be required to supply four boilers, 220 nominal horse power?

Therefore, reckoning one cubic foot per horse power, 120-horse power = 220 cubic feet per hour.

$$\frac{220}{60} = 3.33$$

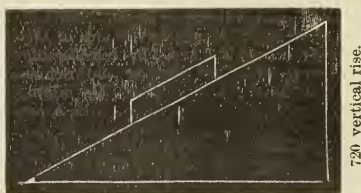
cubic feet per minute.

$$3.33 \times 6.215 = 20.8125$$

gallons per minute.

3. What sizes of hauling engine would be required

100 tons per hour.



1,200 yards = 3,600 feet.

to draw 100 tons per hour up an incline 1,200 yards long, having a gradient of 1 in 5?

$$100 \text{ tons} \div 60 = 1.7$$

tons per minute nearly.

$$\frac{1.7 \times 2,240 \times 720}{33,000} = 83.0836 \text{ horse power,}$$

and there is nothing allowed for friction, &c.

Yours, &c.,

J. R.

Drifton, Pa., Oct. 16, '86.

Siphons.

Editor Mining Herald and Colliery Engineer.

SIR:—Will you permit me to ask some of your experienced correspondents for information through your columns respecting the flow of water through siphons?

Given 300 yards of 3 in. siphon, the apex 18 ft. above and the point of discharge 12 ft. below the intake, what is the theoretical rate of discharge, and how calculated, and what rate of discharge may be expected in practice under the above conditions, with cast-iron socket pipes and lead joints? Is there any treatise on this subject?

Yours, &c.,

INQUIRER.

Birmingham, Ala., Oct. 14, '86.

Rubbing Surfaces.

Editor Mining Herald and Colliery Engineer:

SIR:—By inserting the following in your valuable paper you will oblige:

1. Is there more or less rubbing surface in a circular airway than in any other shapes?
2. I have two airways—one 10 ft. x 10 ft., and the other 9 ft. x 7 ft. How must I proceed to find the rubbing surface of each airway? Describe the method of putting in a length of brickwork in a sinking pit, and what precautions should be taken where gas is given off. What is the effect of gas behind tubing, and how would you guard against it?

Yours, &c.,

STUDENT.

St. Clair, Pa., Oct. 19, '86.

Water Gauge and Other Points.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you kindly insert in your next issue the following questions:

1. If a road in a mine is 36 ft. area, and 7,000 ft. of air pass per minute, and the same quantity passes in a road 4 ft. area and 100 ft. long, the water gauge the same in each case, how long is the larger road?
2. A fan moving at the rate of forty revolutions a minute, with a water gauge of $1\frac{1}{2}$ in., produces 20,000 cubic feet a minute, and the engine making 8-horse power. What will be the water gauge, the number of revolutions and the horse power to get 40,000 in the same mine?
3. In unwatering a fiery mine the workings to the rise, and pumping water to the surface, what would you expect?

Thanks to your correspondents for their kind answers.

Yours, &c.,

A. C. S.

Carbondale, Pa., Oct. 15, '86.

Desires the Air.

Editor Mining Herald and Colliery Engineer:

SIR:—Would you kindly insert the following in your next issue? Would any of your readers answer the following questions?

1. Supposing 25,000 cubic feet of air pass in a circular airway 14 ft. diameter, what quantity will pass in a round air course 5 ft. diameter, power remaining the same?

2. What quantity of water is lifted per minute by a pump, the diameter being 14 in.; length of stroke 4 ft. and 5 strokes per minute?

3. Supposing you sink a shaft 300 yards deep, 14 ft. diameter, to a seam of coal 5 ft. thick, what arrangements would have to be made to get 1,000 tons of coal to surface in nine hours—strength of rope,

size of engine, size of drum, size of pulley-wheels?
4. Which are the best books adapted on machinery for students?

Yours, &c.,

Q. U. C.

Houtzdale, Pa., Oct. 18, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer.

SIR:—Will any of your able correspondents answer the following question:

1. What are regulators used for, how constructed, and is it advisable to use many or not?
2. How would you ventilate a mine so as to obtain a large amount of air with a low velocity?
3. Why is there so much air unnecessarily lost in mines between the inlet and face of mines generally, and how can it be prevented?

Respectfully,

T. B.

Phillipsburg, Centre Co., Pa., Oct. 13, '86.

Deposits of Coal.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you kindly insert the following details in your paper? Perhaps some your correspondents might interest themselves by sending a reply:

A seam of coal is found a few feet from the surface, an incline plane having been driven in the seam a distance of 600 feet, at an angle of 25 degrees of the level. The coal seam is 10 feet; in burning it produces a long flame with no smoke. The mine is situated on rising ground about two miles from the river. The mine's mouth is 30 feet higher than the river bank; at low water coal measures are exposed. Then 2,000 feet to the rise of coal outcrop the limestone are exposed, and further on in this direction, some twenty miles in the hilly regions, there are rich deposits of copper, iron ores, and anthracite, but the latter is inferior in quality for smelting. The question is, a better class of coal is required in order to utilize the mineral deposits on the spot; and so far the coalfields have been proved by the diamond rock borer to a depth of 600 feet. 300 feet below the seam now working, no coal being found, boring was stopped; "although in productive strata, sandstone and shales." Supposing other seams are found, would it not occur in them the same nature and the quality as the seam now at work? Or would it not be possible to find a steam coal or anthracite in the higher or lower depths?

Yours, &c.,

J. R.

Pittsburg, Pa., Oct. 18, '86.

A correspondent writes to the effect that he does not believe in the theory of low water causing boiler explosions. He says: "I once saw a marine boiler with fire-box, crown sheet and return tubes that was dry or nearly so. There was a good fire and the boiler was pumped full of water, without injurious effect. I ran a hundred horse-power boiler two hours with water below the fourth row of tubes, and pumped water back to proper level without stopping. Three weeks ago the boiler I have in charge was dry with a good fire. I pumped it full without pulling fire; it did not blow up, but every tube started leaking. Such practice does not do a boiler any good, but it will not blow them up unless repeated. No one will assert that a boiler may certainly be blown up by the practice our correspondent delineates, but if there is any one besides the engineer exposed to such carelessness, it is criminally negligent. Boiler sheets heated red hot are not only weak at the time, but when suddenly cooled are subject to fracture. Pumping up a boiler when the sheets are red hot is a foolhardy practice.

The American order of steam engineers has been incorporated in Brooklyn, N. Y. The business and objects of the society, as described in their corporate certificate, are: "First, to promote a more thorough knowledge in its members of practical and theoretical steam engineering; second to assist members to obtain employment; third, to help the sick, injured and distressed, and bury the dead; fourth, to establish a widows' and orphans' fund; fifth, to help members who shall become incapacitated from following the profession, and to obtain employment suited to their affliction. The principles of the society shall be, that believing that ability will bring its full value in the market of this country, this society shall at no time take part in strikes nor interfere in any manner between employer and employee; recognizing their identity of interest it shall take no part in any project or enterprise that shall interfere with perfect harmony between them, neither shall it be used for political or religious purposes." About a hundred well-known engineers in New York and Brooklyn have started the association, and branches will be established in other cities.

In New South Wales a variety of cannel coal, commonly called kerosene shale, occurs in saucer-shape deposits from a few inches to five feet thick. The richest quality yields upward of 150 gallons of crude oil per ton, or 18,000 cubic feet of gas, with an illuminating power of from 38 to 45 sperm candles, and on this account it is found advantageous for mixing with ordinary coal in the manufacture of gas, and is largely exported to Great Britain, America, and other foreign countries, as well as the neighboring colonies, for gas purposes. The quantity raised in 1885 was 31,618 tons, valued at £72,176.

MINERAL PRODUCTS.

What the Delvers and Artisans Added to Our Wealth in 1885.

The following condensed statement of the mineral production of the United States in the calendar year '85 is from advance proof sheets of a report shortly to be issued by the United States geological survey. This volume will be the third of the series known as "Mineral Resources" reports, prepared by the division of mining statistics and technology.

Coal.—The total commercial product of coal of all kinds, exclusive of that consumed at the mines, known as colliery consumption, was 95,834,705 long tons, valued at \$152,915,108. Of this 32,265,421 long tons were Pennsylvania anthracite, valued at \$72,274,544; while of other coals, including bituminous, brown coal, lignite, and small lots of anthracite produced outside of Pennsylvania, the production was 63,569,284 long tons, valued at \$80,640,564 at the points of production. The total production including colliery consumption was: Pennsylvania anthracite 34,228,548 long tons, all other coals 64,840,688 long tons, making the total absolute production of the coal mines of the United States 99,069,216 long tons, valued as follows: Anthracite, \$76,711,948; bituminous, \$82,347,648; total, \$159,019,596. The total production (including local consumption) of anthracite was 1,052,792 tons in excess of that of '84, and its value was \$10,320,436 greater. The total production of bituminous coal was 8,889,871 tons less than in '84, but its value was \$4,954,582 greater. The total production of coal of all kinds showed a loss in tonnage of 7,837,079 long tons compared with that of '84, but a gain in value of \$15,251,018, the increase in value being due to an average increase of 25 cents per long ton. The total value is about the same as that of '83.

Coke.—The total production of coke was 5,106,696 short tons, valued at the ovens at \$7,629,118. Of this Pennsylvania produced 78 per cent., or 3,991,805 tons, valued at \$4,981,656. The remainder was produced by fourteen states and territories. The maximum production of coke in the United States was reached in 1883, when 5,464,721 tons were made. This declined in '84 to 4,873,805 tons. The production of '85 shows a gain upon that of '84, being within 360,000 tons of the make in '83.

Petroleum.—The total production was 21,842,041 barrels of 42 gallons, of which the Pennsylvania and New York fields produced 20,776,041 barrels. The total value, at an average price of 87½ cents per barrel, was \$19,193,694. The production showed a decrease of 2,247,717 barrels and \$1,282,600 in value from '84.

Natural gas.—No record is kept of the yield in cubic feet. The amount of coal displaced by gas in '85 was 3,161,600 tons, valued at \$4,854,200. In '84 the coal displaced was valued at \$1,460,000. The yield has increased tenfold since '83.

Iron.—The principal statistics were: Domestic iron ore consumed, 7,600,000 long tons; value at mine \$19,000,000. Imported iron ore consumed, 390,786 long tons; total iron ore consumed, 7,990,786 long tons; pig iron made, 4,044,526 long tons, a decrease of 83,435 tons as compared with '84; value at furnace \$64,712,400, or \$9,049,224 less than in '84. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplication, \$93,000,000, a decline of \$14,000,000 from '84.

Gold and silver.—The mint authorities estimate the value of the gold produced at \$31,801,000, an increase of \$1,001,000 over '84. The production of silver is similarly estimated at \$51,600,000, an increase of \$2,800,000 over '84.

Copper.—The production including 5,086,841 pounds made from imported pyrites, was 170,962,607 pounds, valued in New York at \$18,292,999 at the average price of 10½ cents per pound. The increase in pounds over '84 was 25,740,667; in value \$503,312.

Lead.—Production, 129,412 short tons. Total value, at average price of \$81 per short ton at the Atlantic coast, \$10,469,431, a decline of 10,485 tons and \$67,611 in value from the product of '84. The production of white lead is estimated at 80,000 short tons, worth, 5144 cents per pound, \$6,300,000.

Zinc.—The production of metallic zinc was 40,688 short tons, valued at \$53,539,856 at an average value of 4.35 cents per pound, an increase of 2,144 tons and \$117,149 in value over '84. Zinc was also made from the ore directly into zinc white (zinc oxide) to the extent of 15,000 short tons, valued at \$1,050,000.

Quicksilver.—Production, 32,073 flasks (of 763 pounds net), or 160 flasks more than in '84. Total value, at an average price of \$30.53 per flask at San Francisco, \$979,179. The production of quicksilver vermilion was about 600,000 pounds, total value \$312,000.

Nickel.—The production of metallic or "grain" nickel was 245,504 pounds, valued at \$169,397. In addition, matte and ore containing 32,400 pounds of nickel were exported. Total value of all nickel, \$190,000.

Cobalt.—The amount of cobalt oxide was 8,423 pounds valued at \$19,373. The total value of cobalt in ore, matte, and the above oxide was \$65,373.

Manganese.—The production of manganese ores was 23,258 long tons, valued at \$190,281. Manganiferous iron ore, 3,237 long tons, valued at \$17,318. Total value, \$207,599.

Chromium.—The production of chrome iron ore was 2,700 long tons, valued at \$40,000. The consumption for making potassium and sodium bichro-

mates increased markedly, due to imports of chrome iron ore from Asia Minor.

Tin.—Probably 200 tons of "black tin" were made at the concentrating works at the Etta mine in Dakota. No smelting works have yet been erected.

Platinum.—The amount of crude platinum mined was about 250 troy ounces, valued at \$187.50. This is exclusive of about 300 ounces of iridosmine, for pointing pens.

Aluminum.—The production of metallic aluminum was valued at \$2,550. Aluminum bronze, containing 10 per cent. aluminum, was made to the amount of about 4,500 valued at over \$1700.

Brick and tile.—The demand and consequent production increased to an estimated value of \$35,000,000.

Cement.—The production of cement from natural rock increased to 4,000,000 barrels of 300 pounds each, but was valued at only \$3,200,000. Artificial Portland cement amounted to 150,000 barrels of 400 pounds each, with a total value of \$22,500. The total production of cement of all kinds was 4,150,000 barrels, valued at \$3,495,500.

Precious Stones.—The value of American precious stones produced was \$69,900. This includes \$42,700 for stones sold as specimens and souvenirs and \$27,100 for stones to be cut into gems. Besides this, gold quartz, with an estimated value of \$140,000, was sold for specimens and for ornaments and jewelry.

Phosphates.—With the exception of a local consumption of about 1,000 tons in North Carolina, the total production of phosphate rock came from South Carolina, and amounted to \$437,750 long tons of washed rock, at an average value of \$6.50 per ton.

Gypsum.—The estimated production of land plaster was 100,600 short tons; of calcined plaster 72,200 tons; total 172,700 tons, valued at \$959,600. The above includes 75,100 tons from native stone, the remainder being imported from Nova Scotia.

Salt.—The total production was 7,037,653 pounds. The total value of all salt produced was \$4,930,621.

Bromine.—The production increased slightly, being about 310,000 pounds against 271,100 the previous year. The total value was \$89,900.

Sulphur.—The production was only about 700 tons, worth about \$18,000.

Pyrites.—About 49,000 long tons were mined, valued at \$220,500. In addition 47,500 tons were imported.

Barytes.—The production was about 15,000 tons, valued at \$75,000, in the underground condition, as taken from the mines.

Mica.—The production decreased in the west, owing to the inferior value of the sheets obtained. The whole product, excluding waste, was 92,000 pounds, valued at \$161,000.

Asbestos.—The amount mined was about 300 short tons, valued at \$9,000.

Asphaltum.—The production remained constant at about 3,000 tons, with a spot value of \$10,000.

Totals.—The statements made in the last report in regard to the total mineral product require little change for the year. The statistics have been compiled with a view to giving information on those points which are of most interest and utility, and are presented in the form usual in the several branches of trade statistics. Comparing the totals given since '82, a continuous decrease in value will be noted in the next two years. The past year shows on the other hand, an increase, due, no doubt, in part to more complete returns and closer estimates, but indicating, nevertheless, a more profitable business year, which would be still more apparent if the last half were compared with the corresponding period of last year, since, in many important branches of trade, prices increased towards the end of the year.

The Biggest Thing in the South.

The big trade closed at Birmingham lately, by which A. M. Shook, Nat. Baxter and John Inman bought about \$1,500,000 of the stock of the Pratt coal company, is the consummation of an end which has been reached through a succession of big trades that promise great things for Alabama, and, in fact, for the whole south. The coal and iron property embraced in this trade and owned by this company is by far the most magnificent piece of property in the United States and owned by one company. The property in its natural state consists of a solid mountain of ore, far surpassing the Iron mountain of Missouri, placed by the side of a coal field which, for all uses, especially iron making, is the most remarkable on this continent. Including the furnaces now in operation and being erected, all to be finished in two years, at Birmingham, there are eighteen. There are three being erected at Sheffield, and another company preparing to erect four more at Sheffield or in that neighborhood. These will be completed in two years. This will make in Alabama twenty-four coke furnaces. At the two points these furnaces will average at least 100 tons of iron a piece per day, or 2,400 tons of iron. At the lowest figures it will bring back \$30,000 daily. It will give employment to about 12,000 men, supporting a population of from 60,000 to 70,000 people.

The business colleges of the United States have within twenty years multiplied from a few institutions to several hundred, some of which have an annual registration of over 1000 students each. United States Commissioner Eaton reports a greater number of graduates from the business colleges than from the colleges of law, medicine and theology combined. Official reports show about 50,000 students during the past year.

MATTERS IN COAL.

The Clearfield bituminous coal company has been reorganized and its capital reduced to \$1,650,000.

The parties proving for coal on the Penrose estate east of Beaver Meadow, Carbon county, Pa., are now using diamond drill.

Coal has been found in the Whetstone mountains, Arizona. The coal is said to be anthracite, and the seam is five feet thick.

H. Florsham, of New York, is shipping coal to Dakota on a contract just made. The freight per car at destination is \$135.

The expense for the inquests on the bodies of the victims of the Lansford Pa., boiler explosion will have to be met by the Lehigh coal and navigation company.

The Percy mining company of Uniontown, Pa., has been chartered with a capital stock of \$60,000, to manufacture and sell coke, with the right to mine, prepare for market and sell coal, iron and ore.

The Lehigh coal and navigation company will increase its rate of dividend from five to six per cent., the latter being the old rate. The next dividend will be declared the fourth Tuesday in November.

There are probably 100,000 workmen engaged in the anthracite coal traffic. The better the prices of the coal the more they get for wages, and it is now too late to deny that good wages and prosperity go hand in hand.

The recent discovery of a coal ring in Milwaukee, which had for its object the advancement of the price of coal and maintenance of rates, has created a strong feeling of indignation. This has culminated in a demand for the summoning of a grand jury to investigate the members of the combination and secure their indictment on a charge of conspiracy. The matter has been presented to Judge Mallory and he now has it under advisement.

Locomotive Firemen.

In Port Jervis, N. Y., December 1, 1873, 11 men following the vocation of locomotive engineers, laid the first stone in the foundation of as grand a structure as was ever conceived by man. Desiring to benefit themselves, and elevate their social and moral standing, and knowing that this could only be brought about by organization, working together, meeting together, associating together, they commenced their life work, knowing that they would have obstacles to overcome and battles to fight, yet with a determination to carry forward the good work until every worthy locomotive fireman in the land would be an honored member of the organization. The obstacles that strewed their pathway, the discouragements they encountered, were all overcome, and month after month, year after year, they saw their structure growing. Out from the little town of Port Jervis went the influence of benevolence, sobriety, and industry, the true motto of the order. Locomotive firemen everywhere felt the elevating influences of the brotherhood, and came flocking to its standard, and new lodges were instituted, until today, only a little over 12 years, we see a grand brotherhood composed of 330 lodges, containing 17,000 as noble men as ever breathed the free air of America, standing beneath a banner inscribed with a title that brings joy to every locomotive fireman's heart, "The Brotherhood of Locomotive Firemen of North America," the result of ambition, progress and devotion to duty. When we contemplate the rapid growth of our brotherhood, how in thirteen years it has grown in numbers from 11 to 17,000 members, we cannot help but admire the work of the men that only a few years ago were looked upon as being devoid of principle and unworthy the association of respectable people. Organizing themselves together for the purpose of advancement, selecting for their watch words, "Benevolence, sobriety and industry," living true to every obligation, faithful in the discharge of every duty, they saw their efforts crowned with success, and today, wherever the locomotive proclaims the advance of civilization, you find the locomotive fireman an honored and respected member of society.—Grand Master Sargent, B. L. F.

Piedmont Coal and the Pennsylvania Railway.

The Baltimore Sun has the following respecting the development of the Piedmont coal region: "There is considerable interest felt in the new departure to be made by the Pennsylvania railroad company in bringing to the eastern markets the coals from the Piedmont region of West Virginia, a coal which that company has extended a line of railroad. Heretofore the product of these extensive coal fields has gone to the market over the Baltimore & Ohio railroad. Ex-Senator Davis, of West Virginia, who is the owner of the lands, and who has developed them, has quarreled with the Baltimore & Ohio, and the result has been that he has joined the Pennsylvania railroad company in extending a line from Cumberland down to his Piedmont region, and the product will come to market over the Pennsylvania railroad system. The coal will of course, compete with the Clearfield coal, and the effect that it will have upon the latter is anxiously awaited.

COAL DUST.

INTERESTING AND IMPORTANT EXPERIMENTS TO DETERMINE ITS EXPLOSIVENESS.

How Fire Damp and Blasts Affect It.

From "Transactions of the Mining Institute of Scotland."
(Continued from Page 361.)

Sir Frederick Abel signed his report in March, '81, and in '82 Mallard and Le Chatelier, members of the French commission, published the results of their inquiries into the part played by coal dust in colliery explosions, and severely criticised the methods of experiments and the results arrived at by Abel and Galloway. The French commissioners set forth that in all explosions attributed to coal dust alone the absence of fire-damp could not be shown; that flame from a blown-out shot was but little increased by the presence of the most inflammable dust; and that the only part coal dust could play would arise from the gas distilled from it by the heat of a fire-damp explosion, and this development of gas might not occur till after the actual accident, so that the effects of these gaseous products in increasing the force of the explosions might often be nil. They consider the readiness with which explosions are attributed to coal dust, to be due to the fact that both its existence and effects are visible: before an accident it is seen everywhere; during an accident the smoke resulting from its combustion is emitted from the pit's mouth and after an accident its cooked product is found adhering to the timber. On the other hand fire-damp is invisible and leaves no distinctive trace of its existence. They point out that in lignite mines, where dust is of the most inflammable description, no accidents have occurred because of the absence of fire-damp. Having stated their reasons for disagreeing with the conclusions of other investigators, they give their own views, account for explosions chiefly by the fact that in actual practice less than 4 per cent. of fire-damp cannot be detected by the Davy lamp; that the difference between this and the 6½ per cent. necessary to bring the air to the explosive point is so little that many causes, too numerous to mention, may raise the proportion of gas through this small margin, either by diminishing the volume of air or increasing the quantity of fire-damp.

It seemed necessary in view of these criticisms and differences of opinion, to inquire further into the effects of coal dust, and as the experiments of the Prussian fire-damp commission (some of which were witnessed by one of the British commissioners) were conducted in a gallery approximating in magnitude to the working places of a colliery, they may be considered as decisive of the points disputed. They completely upset the views of Mallard and Le Chatelier.

These experiments were carried out in an elliptical main gallery 167 feet long, 5 ft. 7 in. high, and 3 ft. 11 in. wide. It was closed by a block of brick work at the shot end and open at the other, and it had an off-shoot gallery, 33 feet long, at right angles to it, at a distance of 93 feet from the closed end. Seven cast-iron cannon were built into the block, the centre one 15½ in. diameter, and 37½ in. long, and the others 13½ in. diameter and 37½ in. long, and all pointed to a spot in the axis of the gallery, 16 feet in front of the brick work.

Experiments were made to find the extra length given to a blown-out shot flame by coal dust tamping.

POWDER CHARGE.	LENGTH OF FLAME	
	Clay Tamping.	Coal Dust Tamping
Oz.		
7½	91 10 17 to 137 0 17	201 6 17 to 527 6 17
18	137 0 17	627 0 17

Experiments were made on the power of blown out shots to raise and inflame dust. 1 lb. of dust per running foot was laid on the floor of the gallery for 33 feet from the shots. Charge, 7-4oz. of powder, fired from cannon near floor.

	Length of Flame.
Very Fine Dusts.....	60 to 102 Feet
Fine Dusts.....	43 to 69 "
Medium Dusts.....	39 to 49 "
Coarse Dusts.....	29 to 39 "
Anthracite Dust (Dust Tamping).....	36 to 39 "

With inflammable dusts, clay and coal dust tamping gave the same results. With less inflammable dusts, however, the flame was considerably extended by coal dust tamping.

While, with coarse dusts of low inflammability, the flame could not be got to reach beyond 39 feet, however far in advance the dust might be strewed, with two very fine and highly inflammable dusts,

the flame continually increased as the strewing was extended until, with 130 feet of the floor laid with them, the flame reached 16 feet outside the mouth of the gallery—that is, it had a total length of 146 feet.

Violent explosions resulted with either of these dusts when they were strewed in excess of 66 feet, and columns of flame from 3 to 6 feet in height, followed by dense black smoke, were projected from the vent holes of the gallery.

The influence of coal dust on non-explosive mixtures of fire damp and air.

These experiments completely corroborate the conclusions arrived at by Mr. Galloway, and afterwards by Sir F. Abel.

Experiments were made on the elongation of a blown-out shot flame, produced by coal-dust stemming when fired into gas mixtures.

The commissioners quote results evidently taken from the following table. The force of the explosion was measured by the distance a truck placed on rails at the mouth of the gallery was forced up an incline of 1 in 14.

DUST FROM THE KONG PIT				DUST FROM NET-ISERLOON.			
Percentage of Gas.	Length of Flame, Feet.	Distance Tub blowing along Railway, Feet.	Speed of Flame, Feet per second.	Length of Flame, Feet.	Distance Tub blowing along Railway, Feet.	Speed of Flame, Feet per second.	
0	45.9	2.20		49.2	2.90		
1	49.2	2.95	One yard	62.3	3.93		
2	52.5	3.28	per second	75.7	4.92		
3	55.8	4.10		89.1	7.21		
4	59.0	4.90		102.5	8.20		
5	62.3	5.70	Like lightning	115.9	11.10		
6	134.5	45.90	Explosion.	144.2	23 to 32.8	Tub much damaged.	

It was also proved (1st) that a fire-damp mixture some distance from a blown-out shot could be fired by the flame transmitted by coal dust; (2nd) that an atmosphere in the main gallery, containing 7 per cent. of gas, ignited by a blown-out shot, exploded coal dust in the cross gallery, although there was an intervening space of 56 feet altogether free from gas and coal dust; (3rd) that flame produced by the ignition of coal dust in the main gallery developed an explosion of coal dust in the side gallery, although there was an intervening space of 26 feet altogether free from coal dust.

Action of Dusts.—We have already discussed the probable action of incombustible dusts. Faraday, Vital, Marocco and the Prussian commissioners all attribute the action of coal dust to be due in part to the combustion of the dust itself, and also to the fact that gas is distilled from it by heat. The first portion of the dust acted upon by the flame of the shot yields gas which mixes with the air and is fired; this decomposes a farther quantity of dust which is in its turn ignited, and so the explosion is propagated.

Secondary or back explosions have been noticed with dusts most favorable to the propagation of flame. They are due either to part of the gas developed from the dust by the first explosion remaining unburnt through deficiency of oxygen, or to gas being developed from dust within the highly heated space of the first inflammation. The rush of air after the first explosion effects the combustion of such gases with explosive violence.

A calculation, founded on the volatile matter existing in the most inflammable dusts used in the Prussian experiments, and on that found in the coked product after an explosion, shows that if the whole of the dust were equally acted on by heat, 70 cubic feet of gas would be formed in the 33 feet of gallery which had been strewed—equal to 12 per cent. of its contents. A great part of the dust escapes the action of heat, but the figures afford an indication of how explosion may result in the complete absence of fire damp.

To secure immunity from explosions when blasting either (1st) the dust must be removed, or (2nd) rendered innocuous; or (3d) means adopted for the prevention of blown-out shots; or (4th) the explosives or methods of using them must be so modified as to prevent the ejection of flame or sparks; or (5th) other methods substituted free from the dangers attending the use of explosives.

TO BE CONTINUED.

ELECTRIC LAMPS.

Arguments Pro and Con Relative to Their Adoption in Mines.

The London *Colliery Manager* strongly urges the adoption of electric lanterns in place of ordinary mining safety lamps. A portable electric lamp can now be made, possessing the following features: Weight, about three pounds only; illuminating power, five candles; size and shape, similar to the present lamps, duration of light, ten hours; cost of repairs, charges for battery and materials, one penny for ten hours. It will be seen that in these respects there is nothing to prevent its immediate adoption, and the entire displacement of the present lamps, and even candles, in many mines where they are still in use.

A strong argument in favor of the continued use of candles in slightly gaseous mines in that they give a better light than the safety lamps, and throw a stronger light on the roof. But this argument is entirely overthrown by the electric lamp, for its il-

luminating power is some fifteen or twenty times as much as a Clanny lamp, and about ten times that of the ordinary miner's candle.

The small globe which contains the incandescent can also be placed on the top of the lamp, throwing its light all around as easily as in any other position.

The electricity in this lamp is supplied by a primary battery.

While it is satisfactory to hear that the weight is only three pounds, and therefore but little heavier than present lamps, which are generally about 2½ pounds, it would surely be a mistake to allow that consideration to stand in the way of the adoption of a lamp which offers so many and great advantages, and we should not hesitate to waive the objection if the weight were six pounds, though it would certainly be less convenient to carry for firemen and others who have much walking in the mine.

It has been said that the cost of a number of lamps would not exceed twenty shillings each, and that, if manufactured in very large quantities, the cost would be considerably less.

In respect to the consequence of breaking a lamp in gas, there is admittedly a spark exposed at the precise moment of breaking the vacuum globe; but this immediately dies out, and electricians anticipate no danger from it, in even the most explosive atmosphere.

The present lamps may receive many jars and shocks, and even be dropped to the ground, without serious injury, and frequently without putting out the light; but it is to be doubted whether their future rival, the electric, will be equally obliging, although, in this respect, much may possibly be done by constructive modifications.

The heat of the portable electric lamp is quite inconsiderable, and to hold it aslant or to splash it with water will in no way damage it. These are valuable features, and there are many others. Its light will neither affect nor be affected by the purity of the surrounding air, and it must very much increase the comfort and health of miners to remove from a large mine several hundreds of the present lamps, which, burning not only a large quantity of oil daily, but many of them also burning a large quantity of fire damp, though then giving less light rather than more, have an effect on the atmosphere which may not be noticeable with the thermometer or a chemist's appliances, but that much reduces the comfort and health of the miners, and would be gladly dispensed with by men working in hot mines.

The electric lamp has also all the advantages which attach to a superior light. Nearly every kind of work may with it be more efficiently performed, especially the cleaning of the coal before loading. The dangers of hanging roofs and sides are brought into prominence, and thus great advances are made in both safety and economy.

It must be said for the present lamps that their light gives warning of the presence, in dangerous quantities, of noxious gases, and thus warns off a possibility of suffocation; and that when the existing chief security for pure air is removed, the maintenance of an adequate ventilation may be neglected, and injury to health caused thereby to the miners. But, though a very convincing witness of impure air, when silenced, another will yet remain, for happily the fire-damp of mines is usually accompanied by a smell which the practiced miner can readily distinguish. And, further, it must be conceded that if it is thought necessary to retain in a mine a few "safety lamps" in the hands of the firemen, the chance of an explosion emanating from a safety lamp will be lessened in at least the same proportion as the number of such lamps. But for one part, we would go to the full extent, and not retain one of the present lamps, except as gas indicators for use in shot firing, and then only failing the practicability of other indicators.

We believe the adoption of electric lamps will not give rise to neglect of ventilation, but quite the reverse, for, as we have suggested, the necessity of limiting the maximum velocity of the air currents will be removed, and in the majority of large mines very large air roads have been formed, and only an increased water gauge will be needed to circulate a much larger volume of air. This may well be the next step in the onward march of the mining art.

Let us see, then, the picture which is conjured up by these thoughts for the morrow. A mine most brightly illuminated, which has not the odor of burning oil, which has no lamp stations, no lamp keys, no caution boards, but with an increased ventilation and higher air velocities, which imply no danger, but cause a purer and cooler atmosphere, and are the result of more powerful ventilation machinery without outlay on the already large airways. To complete the pleasant prospect, one thing is needed, the economical substitution for present explosives, which shall be without danger in the midst of coal dust or fire-damp. The causes which lead to devastating explosions and the wholesale slaughter of the workers will then, we may hope, be altogether overcome, and each man will feel free from the incubus which now ever threatens him, and will know that his safety depends much more than formerly on his own watchfulness. The chief agencies through which a slight flaw at some point of the gross carelessness of someone may now jeopardize hundreds of lives will then be in great measure countered.

TRADE REVIEW.

THE COAL TRADE.

The addition of 250,000 tons to the output for October, by the coal exchange, is the most convincing proof of the briskness and strength of the demand for coal, but whether the action will not have an injurious effect on the winter trade is a matter open to serious question. This crowding of all, or the bulk, of the mining and shipments into one or two months and laying comparatively idle the balance of the year has been the bane of the coal region both to labor and business generally, while it is by no means profitable in the long run to the operators. It would be better for all concerned if a steady average trade were maintained the year through, rather than to have these annual spurts, in which machinery is driven beyond its natural capacity, the carrying trade overtaxed, and labor so pushed to meet demands, and gain as much as it can of the profits of work that risks are unnecessarily and recklessly taken to the great cost of life and limb. Already the accident lists of the past few busy weeks evidence this latter fact and the coming days will demonstrate it even more sadly. It is in the power of the coal managers to spread their trade over the greater part of the year, if they would but go about it in a businesslike and determined manner, and their financial balances at the close of a year would be better for it.

In addition to increasing the October output the combination has put the November allotment at 3,500,000 tons with an understanding to increase those figures also, if the demand shall warrant it, which it is more than likely to do. The western markets are reported to be well supplied at present, although a fair amount of the mineral will yet have to be shipped before the winter fully sets in. At points east stocks are light, however. In the opening of the week at Port Richmond there were only 24,000 tons on hand, most of which was of special sizes. Coal was reported as coming in slowly and the company's colliers are frequently obliged to wait three or four days before being loaded. Stove coal is very scarce, but is in rather better supply in New York. Prices are being strictly adhered to and a good many orders have been refused at present circular prices because the product for the next two months is all sold.

The executive committee of the Lehigh and Schuylkill coal exchanges met Tuesday and decided to make no change in the line and city and harbor prices of coal during the month of November, but to adhere firmly to the circular rates. The line and city prices of hard white ash coal at Schuylkill Haven at present are: Lump and steamboat, \$2.50; broken and chestnut, \$2.75; stove and small stove, \$3; pea, \$1.25.

All the anthracite companies are complaining of a scarcity of cars to carry away coal from the mines to tidewater. Consumers are said to be using all sorts of arguments and even threats to induce shippers to fill their orders at once, but neither has been very effective, for the shippers are powerless. The transportation companies are doing their best, but the demand from all quarters is so great that they are clearing up things slowly.

In the bituminous trade matters are moving along, so far as present trade is concerned, in the even tenor of their way, a fair business being done, yet not such as will duly compensate for the time, experience and capital invested. Cognizant of this fact and guided by the results of the anthracite combination, there is a move being made by a number of coal operators who use the railroads to pool the entire soft-coal production of Pennsylvania, Ohio and West Virginia. The railroads, it is stated, are to have a percentage of the soft-coal production, and the producers are to regulate the production. Several operators who have steady trade established will oppose this plan. Among those who would be affected are the operators of the Baltimore and Ohio, Pittsburgh and Lake Erie, Pittsburg, McKeesport and Youghiogheny, Pennsylvania company's lines, Hocking Valley, Ohio Central and New York, Lake Erie and Western railroads. The success of the move if entered into with good faith cannot be doubted. In passing it may be noted the action is somewhat of a contemptuous reflection on the Pattison-Cassidy move to disrupt coal pools.

The coke industry yields favorable reports, the booming condition of iron business accelerating the demand for coke to such a degree that the various districts are worked to full capacity.

The total amount of anthracite coal sent to market for the week ending Oct. 16, as reported by the several carrying companies, was 823,553 tons, compared with 769,708 tons in the corresponding week last year, an increase of 53,845 tons. The total amount of anthracite mined thus far this year, is 24,799,132 tons, compared with 23,938,332 tons for the same period last year, an increase of 860,800 tons.

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Oct. 16, was 294,443 tons, of which 224,702 tons were coal and 69,741 tons coke. Of this weekly tonnage 227,374 tons originated on the main line of the Pennsylvania railroad while the remainder originated on its branch lines. The total tonnage for the year thus far has been 11,759,905 tons, of which 9,062,548 tons were coal and 2,697,357 were coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending October 23, was 310,000 tons, of which 31,500 tons were sent to and 36,900 tons shipped from Port Richmond, and 31,000 tons were sent to and 33,000 tons shipped from Elizabethport.

The shipments from the mines of the Cumberland coal region for the week ending Oct. 16 were 70,700 tons, and for the year to that date 1,899,985 tons, a decrease of 281,899 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—week, 54,956 tons; year, 1,487,485 tons; decrease, 89,082 tons. To Pennsylvania railroad—week, 30,301 tons; year, 200,658 tons; decrease, 123,716 tons. To the Chesapeake and Ohio canal—week, 12,442 tons; year, 211,842 tons; decrease, 69,098 tons.

Chicago.

From the Industrial World.

There is the same large inquiry for anthracite which has been heard for six weeks past. Dealers are obliged to refuse orders for country delivery, but hope soon to catch up on this line of business. It is safe to say that the full card rates are the prices paid for all sizes of hard coal. Quotations are the same as when last mentioned.

Bituminous coal dealers are enjoying a fair demand, which is steadily growing in proportion as railroads and manufacturers increase their consumption. The tonnage for this season will undoubtedly be far in excess of that of last year. Values are firm.

Trade in coke is in good shape, showing an excellent outside demand.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.

Per gross ton by carload, 2240 lbs	
Grate.....	\$ 6 15
Egg.....	5 60
Stove.....	6 45
Nut.....	6 45
Lehigh Lump.....	8 40
No. 4.....	6 75
Per net ton by carload.	
Grate.....	\$5 50
Egg.....	5 30
Stove.....	5 75
Nut.....	6 00
Lehigh Lump.....	6 75
No. 4.....	7 50

BITUMINOUS.

Erie & Briarhill.....	\$4 35
Pittsburg.....	3 25
Indiana Block.....	2 65
" Slack.....	1 25@1 35
" Nut.....	1 05@1 15
Baltimore & Ohio.....	3 00
Hocking Valley.....	3 00
Youghiogheny.....	3 25@3 35
Wilmington.....	2 10
Blossburg.....	3 25
Cumberland Shufling.....	3 00
Somerset Smithing.....	3 35
Grape Creek.....	2 00
Fountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Mazon.....	2 00
Morris.....	2 00

CANNEAL.

Kanawha.....	4 70
Buckeye.....	4 20

COKE.

Connellsville Coke.....	4 75@5 00
Crushed Coke.....	4 75@5 50
Charcoal, carload per bu.....	8 50@9 50

Pittsburg.

From the American Manufacturer.

All features are substantially the same as reported last week. The Ohio continues too low for the movement of vessels, and there are so few empty craft at the mines that work there is almost entirely suspended. At the railway mines there is a fair activity, but an embarrassing scarcity of cars. Prices remain as follows:

PRICES AT PITTSBURG.

River, wholesale, on board.....	3 50@4 15 cts. per bushel.
Railroad.....	4 50@4 75 cts. per bushel

AT CINCINNATI.

River, wholesale, on board.....	5 00@5 60 cts. per bushel.
Railroad.....	5 50@6 00 cts. per bushel.

AT LOUISVILLE.

River, wholesale, on board.....	5 50@6 00 cts. per bushel
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AT NEW ORLEANS.

River, wholesale, on board.....	25@26 1/2 cts. per bbl.
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Bushels are rated among dealers here at 76 lb.—26 1/2 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

At a meeting of the Connellville syndicate a few days ago it was decided to make the prices of coke for November the same as they are at present. Demand continues very active, and the scarcity of cars is the cause of much dissatisfaction: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Oct. 23, 1886.

	Week.		Year.
	Tons.	Tons	
Shipped North.....	74,142-16	1,868,506-11	
Shipped South.....	59,485-04	2,165,517-13	
Total.....	133,628-00	4,034,024-07	
<i>For corresponding time last year.</i>			
Shipped North.....	68,130-17	1,876,950-08	
Shipped South.....	76,765-05	2,023,648-18	
Total.....	144,896-02	3,900,599-06	
Increase.....			153,425-01
Decrease.....		11,268-02	

MINING NEWS.

The Old Dominion manganese company, of Va., have made a favorable lease to the American manganese company (Crimora) of their output and plant. The properties adjoin each other and the developments on the Old Dominion are of recent date.

The Crystal River *Current* says: At the present time, we have three of the strongest companies in Colorado opening up large seams of coal along Crystal river and Coal and Thompson creeks that will be able to supply an inexhaustible quantity of bituminous and anthracite coal.

D. E. Garrison & Sons, who recently purchased the mines of the Carthage lead and zinc company, Missouri, have commenced taking out mineral, the shafts having at last been freed from water. Prospects are bright beyond expectations, and a large output will result. These mines are rich in "ruby jack."

A second mining company has been organized to operate in the new iron district northeast of Tower, in the Vermilion region. It is named the Pioneer iron company. Exploring parties are prospecting in all directions, and the prediction is made that it will prove quite rich in iron deposits when fully shown up.

Our readers may be interested in knowing what Montana families pay for coal. On and after October 1st, and until further notice, coal will be delivered within the city limits at the following reduced rates:

Rock Spring coal.....	\$10.00
Weber coal.....	9.00
Colorado anthracite coal.....	16.00

MINE ACCIDENTS.

Charles Bickle, a miner in Bellmore colliery, Mt. Carmel, Pa., while starting a battery on the 20th was crushed to death by a rush of coal.

Daniel Morgan, an inside gate tender employed in the Central shift, Scranton, Pa., was run over and killed by a mine car on the 21st.

Michael Norris was crushed to death at Mt. Carmel, Pa., on the 25th by a huge boulder rushing on him from an embankment at the mine company's reservoir.

Mine Inspector Roderick reports nine mine accidents in the Hazleton, Pa., district for September, three of which proved fatal. These fatalities made eight more orphans.

Plans of the Lehigh Valley.

The Lehigh Valley railroad seems to be making extensive preparations for a heavy western trade, and if facilities will capture the business the Lehigh Valley will not be the last in the race. The recent trip of its officials and the orders for extensive improvements, both at Buffalo and at Duluth, do not seem to have finished all of the improvements the company intends making. Plans have been prepared, and the contracts are about to be let for a larger shipping and delivery trestle at Chicago, which is to be ready for business in ninety days. The company has bought a tract of land nine hundred feet long and one hundred feet wide, lying between Twenty-nine and Thirty-first streets, adjoining the Belt road. It is in close proximity to good docks, and is in a splendid location. The plans provide for the building of a large trestle for the storing and trans-shipping of coal to the west, and will have a capacity of 25,000 tons. It is intended principally for winter deliveries. It is very likely that Col. J. E. McIntyre, of Buffalo, will build the trestle. These improvements will cost \$75,000 when finished.

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OIL AND OIL LAMPS.

English Experts Instructing the Public How to Guard Against Many Dangers.

The accidents which occur from the use of petroleum oil lamps have been made the subject of thorough examination in England, where the frequency of the accidents have caused considerable prejudice. The Metropolitan board of works of London has been giving the matter special attention, and notwithstanding the familiarity of residents of the United States with the use of petroleum, some of the suggestions will be carefully perused by housekeepers and others having charge of lamps.

A large number of the accidents with oil lamps are not actually due to the occurrence of explosions, but arise from the fracture of the oil reservoir, caused by the lamp being dropped or upset, or carelessly carried about, or by the burner becoming overheated. Many accidents have, however, doubtless resulted from the explosion of the mixture of petroleum vapor and air formed in the upper part of the oil reservoir. They usually occur after the lamp has been burning for some time and when it is being moved, or is being extinguished by the process of "blowing down the chimney." Such explosions, even if not sufficiently violent to fracture the lamp, may so alarm the person carrying or handling it as to cause the lamp to be dropped or overturned.

If the lamp of which the reservoir is only partly full of oil be carried or rapidly moved from one place to another, so as to agitate the liquid, a mixture of vapor and air may make its escape from the lamp in close vicinity to the flame, and, by becoming ignited, determine the explosion of the mixture existing in the reservoir. This escape may occur through the burner itself, if the wick does not fit the holder properly, or through openings which exist in some lamps in the metal work close to the burner, of sufficient size to allow flame to pass them readily. A sudden cooling of the lamp, by its exposure to a draught, or by being blown upon, may give rise to an inrush of air thereby increasing the explosive properties of the mixture of vapor with a little air contained in the reservoir, and the flame of the lamp, may, at the same time, be drawn or forced into the air-space filled with that mixture, especially if the flame has been turned down, as the latter is thereby brought nearer to the reservoir.

The sudden cooling of the glass, if it had become heated by the burning of the lamp, may also cause it to crack if it is not well annealed; and this cracking or fracture, which may allow the oil to escape, may convey the idea that an explosion has taken place. If the evident common practice is resorted to of blowing down the chimney with a view to extinguish the lamp, the effects above indicated as producible by a sudden cooling may be combined with a sudden forcing of the flame into the air-space, and an explosion is thus pretty certain to ensue, especially if that air-space is considerable.

If the flashing-point of the oil used be below the minimum (73 deg. Abel) fixed by law and even if it be about that point or a little above it, vapor will be given off comparatively freely if the oil in the lamp be agitated, by carrying the latter, or moving it carelessly; the escape of a mixture of vapor with a little air from the lamp, and its ignition, will take place more readily, but on the other hand, it will probably be feebly explosive, because the air will have been expelled in great measure by the generation of the petroleum vapor. If the flashing-point of the oil be high, the vapor will be less readily or copiously produced under the conditions above indicated; but as a natural consequence, the mixture of vapor and air existing in the lamp may be more violently explosive, because the proportion of the former to the latter is likely to be lower and nearer demanded for the production of a powerfully explosive mixture.

Special stress is being laid on the quality and size of the wick used. Loosely-plaited wick of long staple cotton is the best, and it is recommended that it should be just long enough to reach the bottom of the oil reservoir. The wick becomes the depository for all the impurities which may be in the oil, and consequently soon loses its porosity. For this reason the same wick should not be used for a great length of time, and it is decidedly objectionable to use a much greater length of wick than is necessary to reach to the bottom of the reservoir, and to continue its use until it has become too greatly shortened by successive trimmings. The report thinks it is undesirable to construct the lamp reservoir of the fragile materials commonly employed; that channels of communication to the reservoir at or near the burners should be protected by fine wire gauze (twenty-eight meshes to the inch), or be packed with wire, or should not be of a greater diameter than 0.04 inch; and that the wick tube should be prolonged so that the lower end is always sealed by the oil, or the wick surrounded by a wire gauze cylinder of the requisite fineness, and closed at the bottom, which would allow the passage of air or vapor through it towards the burner, while it would effectually prevent the transmission of fire from the lamp flame to the air-space of the reservoir. Among other suggestions made is that the wick should be thoroughly dried before using it, and that

it should be so wide as to quite fill the wickholder without having to be squeezed into it. In extinguishing lamps the flame should be turned down, and then a puff of breath blown across the top of the chimney, not into it. Some of these suggestions have been repeatedly made, but they will bear repetition.

A New Boat-propelling Device.

We are indebted to the *Albany Journal* for the following description of the propulsion of a boat by gas generated from crude petroleum: The principal feature of the engine is that it dispenses with a boiler and burns crude petroleum instead of coal, and that it is run by hydro-carbon gas, generated by the petroleum with condensed air. In the case of the engine particularly described, there was no complicated machinery to get out of order, and the machine ran very easily. It was seen on board a small boat on a trip up the Hudson river, and described as follows: The engine proper is all inclosed in an oblong drum in the centre of an engine-room. The drum is a heavy cast-iron shell 40x21 inches, inclosing two cylinders, each 15x15 inches. Each of the cylinders is inclosed by a jacket, and the space between it and the jacket is kept full of cold water. In the middle of the top of the drum is what is known as the fire chamber, with valves opening into the cylinders. In this chamber is a perforated metal disk, which is covered with a kind of wicking. This wicking is supplied with oil from a tiny supply pipe that admits a few drops at a time. Another supply pipe of similar dimensions admits the air from a neighboring tank. When the fire is to be started, a small lever at the side of the chamber is pushed to one side, disclosing a vent, to which the light is applied. There is no waiting to get up steam, for as soon as the fire is lighted the engine is ready to start. The cylinders are connected with the propeller shaft by cranks from the bottom. At the side of the engine-room are the oil and air tanks. Of the former, there is one having a capacity of 60 gallons. Of the latter, there are three—two reserves and a working tank. A pressure of 90 pounds is kept on the air tanks. In the engine-room are two long levers. By using one the boat is started ahead. By the other the engine is reversed, and when neither is touched the engine runs free without turning the propeller. The connection of the shaft with the propeller is by a friction clutch, which is thrown on or off by the movement of the levers. With everything in perfect condition, the engine running at full speed makes 12 turns of the propeller per minute. The pistons are driven by the expansion of the hydro-carbon gas precisely the same as by steam, and not by the explosion of the gas. The gas exhausts into a large tank in the stern, which causes a hoarse, coughing sound.

A Monument for the Dead.

The Susquehanna coal company had an interview with the relatives of the men who lost their lives in the slope at Nanticoke last December, last week at the company's office in Nanticoke, for the purpose of considering the advisability of erecting a monument over the spot where the unfortunate men met their death. The monument—if it is decided to erect one—will not be a very expensive affair but substantial and in keeping with the sad event—which will ever be remembered as one of the greatest calamities that ever occurred in the anthracite coal regions. A reporter learned from Supt. Morgan that that portion of the mine where the victims now lay will never be opened for the purpose of mining coal. This decision closes the last act in the awful calamity and the graves of the dead will not be opened until the last day. Mr. Morgan was asked if the company had taken any action on Gov. Pattison's last letter requesting the mine officials to renew the search? He replied that Mine Inspector Williams and other expert miners had fully explained to the governor the impossibility of getting the bodies out and that the matter had now been settled forever. Mr. Morgan was also of the opinion that had the governor understood the true situation of affairs, he would never have addressed the last communication to the company. The chief executive was evidently imposed upon by some lawyer who wanted to make cheap capital out of the affair.

A committee of bituminous coal mine inspectors, consisting of Henry Loutitt, James Hlick and J. J. Davis, were appointed two weeks ago by Governor Pattison to inquire into the much mooted question as to whether after-damp is or is not explosive. They have completed their report, saying: "We beg leave to say that we consider the subject in dispute one which baffles the best mining talent to clearly describe the exact condition under which the various mine explosion occur, and to give a satisfactory explanation of where after-damp under its various conditions does exist. It may be said that fire-damp is not explosive only when it is mixed with certain quantities of air or oxygen. Neither would after-damp be explosive under any conditions if a complete combustion had taken place." The committee concludes that the subject in dispute has not received that close attention from the mining authorities which it deserves.

W. IV. A. CHAT ABOUT PUMPS.

How They Should Be Located and Managed to Secure the Best Results.

Power, regarding the theory of the action of a suction pump, suggests that a few words relative to the working of pumps may not be out of place. It has been found that by securing a perfect vacuum the water may be raised by suction to about thirty-four feet, when the apparatus is at the sea level, but this involves a perfectly air-tight pump and a heavy atmosphere. In practice, however, it is best not to attempt to lift water more than twenty-five feet, and even this will give trouble when the valves become slightly worn.

In locating a pump, too, it is best to set it as near the source of supply as possible, and to use the least number of elbows and bends that the connections will admit of, and make the suction pipe plenty large; for the flow to the pump, being entirely dependent upon the light pressure of 147 pounds per square inch, should be made as free as possible.

In setting up a hot water pump, be sure to put in below the source of supply, or you will involve yourself in endless trouble. Hot water cannot be raised by suction with any degree of certainty. The reason is this: It must be pressed up into the pump by atmospheric pressure in the tank or heater, and when the water has reached a temperature of 212° F., the steam given off would have when confined a pressure equal to the atmosphere.

Therefore, when the plunger rises and the water is to be pressed into the pump, steam of atmospheric pressure rises instead to fill the pipes and pump, counter-balancing the atmospheric pressure and holding the water at its own level. If the temperature of the water is less than 212°, it will rise a proportional distance in the piping. But if it is warm enough to give off any steam at all, the pump is liable to stop at any time and make all the way from one to 1,000 strokes before it will fill again.

Clearance is also a matter that should be carefully considered in selecting a lifting pump. After the pump is once filled, the amount of clearance does not have any very great effect, except when the pump is drawn in with the water; but when everything is empty, the pump must act for a number of strokes as an air pump for exhausting the air, not only from the suction pipe, but also from its own cylinder. If the clearance is excessive, the air forms a first-class air cushion, and a great deal of priming will be required before the pump will fill solid with water.

In packing, avoid screwing down too tightly. If this is done, it will cause an excessive frictional resistance, and tend to wear the plunger or piston rod. It is only necessary to screw down tight enough to keep the water from leaking through, but not so that the front of the packing remains dry. If the packing is damp or wet, the water acts as a lubricant upon the plunger and prevents wear. If a vertical plunger pump is in use, the gland is usually made cup-shaped, so that any leakage through the packing is retained about the plunger, serving to keep it tight. It is well to allow of leakage enough at this point to keep a little water in these cups, as the packing may then be left quite loose, and the pump worked with the least possible friction. Of course an excess that would keep water streaming down the side of the pump must not be allowed; and in horizontal pumps, any leakage at all is objectionable.

The main difficulty in most places where pumps are either in use or held for reserve is that they receive too little attention. A pump is usually a generous, whole-souled piece of mechanism, that seems to try to pour out the full quota, and when this cannot be done, it will give an occasional gurgle or squirt as though it would say, "I'm doing my best, and I'll be all right soon." So an engineer will fuss and fool around, and talk about a bad pump, and say it's no good, when the trouble lies with him. He would not think of letting his engine get the treatment that is so fitting for his pump. There will be a neglect to oil or pack or clean, and as for wiping, that does not seem to be thought of in many cases. Then the pump is stuck off in some corner where it is "out of the way," and the suction and delivery pipes are made to crawl all around the walls, under the floor, and across the ceilings; elbows and tees abound, and if the work is put up in warm weather there is no protection whatever from freezing.

The writer knows of one case where the cold water pump was so located that ten elbows were used between the cistern and the heater; whereas, if the pump had been put directly across the engine room, and been driven by the same line of shafting, had all that would have been required, besides affording complete protection against freezing; whereas, where they were run, every cold snap means a half day thawing out and all hands are idle in consequence. But the pump was put and kept where it would be "out of the way."

Nearly all the mason-work is finished at the Old Forge mines near Pittston, Pa., located at the head of the canal. The timber is being framed, and will be erected as soon as possible. The stockholders are mainly Scranton business men.

BEFORE THE INSPECTOR.

A Conversation That Has a Special Interest to Aspiring Foremen.

Inspector: "What is one of the greatest sources of trouble and expense in operating steam-boilers."

Candidate: "The water from which steam is generated. It is very rare to find a perfect water for steam purposes—one which does not deposit a great deal of scale, mud, or have an acid reaction upon the plates. River water, especially near large cities where manufacturing of all kinds goes on, should be carefully watched as to its effects on the boiler, for the character of the water may change at any time. Artesian well water is as liable to be injurious to a boiler as any other, depending mainly upon the nature of the soil in which the well is bored."

Inspector: "How can the quality and nature of any water be determined as to its fitness for steam purposes?"

Candidate: "In no other way than by analysis. A chemical dissection, if this is a proper word, reveals exactly the amount and nature of the minerals held in solution. A crude method is proposed by some of evaporating a certain quantity of water in a vessel, and weighing the solid matter which is left behind, but this requires experience to deal with it successfully, and is sure to be unsatisfactory in practice."

Inspector: "Can any of the foreign matter be removed by filtering?"

Candidate: "The solid matter held in suspension in the water can be taken out by properly constructed filters, but that which is chemically dissolved in it cannot be filtered out, unless the water is previously treated with some chemical agent."

Inspector: "Give me an example of what you mean by treating it with a chemical agent."

Candidate: "Suppose, for instance, that the water is hard, as it is called. It must then contain in some form in excess, probably sulphate of lime, commonly known as plaster-of-paris. If this is suspected, the antidote is sal-soda, this effects a decomposition, the result being soluble sulphate of soda, which does not adhere or form scale. Chloride of barium is also used for precipitating sulphate of lime, but all this work must be done in a tank. A common test for lime in water is oxalic acid, which may be procured at any drug store; this forms an insoluble white precipitate with lime, which settles in the bottom of the test glass or vessel."

Inspector: "Suppose I am an engineer, and apply to you for advice as to the best method of getting the scale out of my boiler; would you tell me what you have?"

Candidate: "No, sir."

Inspector: "Then why do you give such an answer to me?"

Candidate: "For the reason that it is a reply to your question. You have not said anything about taking scale out of boilers. You asked me about the test of water as to its fitness for steam purposes."

Inspector: "You are correct; I was under the impression that we were discussing boiler scale, but one question leads to another. Would any of these substances form scale in the boiler if used in it without removal?"

Candidate: "They certainly would; in conjunction with more or less actual dirt and vegetable matter held in suspension in the water, they would form tons of scale in a boiler if not removed. If we know the quantity of solid matter to the gallon in the water it is very easy to calculate the number of gallons evaporated daily, and find how much refuse is put into the boiler in a week or a month."

Insp. "Is there any way of removing the carbonate of lime before it goes into the boilers?"

Candidate: "There are many ways by which it can be removed; there are some heaters designed to remedy this difficulty, but they take out only the excess of lime, leaving the water still holding an injurious amount. The difficulty with all the processes is that they require too much time to be practically useful. They also require duplicate sets of apparatus—tanks, for instance. These take up space and cost money, and steam users do not want to be bothered with them. If hard water is heated to the boiling point in a vessel, and allowed to cool slowly, the carbonates of lime and magnesia in the water will be precipitated. This because the carbonic acid which holds these salts in solution is expelled by boiling, and the salts of lime, being insoluble, fall to the bottom; but where thousands of gallons of water are used daily any such method as described is impracticable. Boilers can only be protected from scale by careful watching and attention, by blowing them out at the proper time, and by washing them down after such blowing out. Where scale has already formed, it can, if not of too long standing, be removed by certain compounds sold for the purpose. There are a great many of these which are excellent, and perfectly harmless in their results if properly used—*Mechanical Engineer.*

COKE NOTES.

Work on the coke ovens for the Crescent coal company of West Virginia, is progressing finely.

M. Saxman and company are sinking a test shaft on their coal land near Bradenville, Westmoreland county, Pa.

Nine million bushels of coal are lying in the Monongahela river waiting for a rise big enough to carry the barges out.

District Master Workman Johnson says there will be no strike on the Monongahela this winter, if present wages are maintained.

The miners of Salisbury, Pa., have organized a co-operative coal company and are taking steps to open a mine on the property of the Keystone coal company.

The Longdale iron company, who operate extensive coal mines at Seawell, Fayette county West Virginia, will, in the next six months, erect sixty additional coke ovens.

The scales on the tippie at Woods Run, Washington county, Pa., were inspected on the 16th by Inspector Loutitt and it was found that 104 pounds, instead of 76, were required to make a bushel.

A Pittsburg coke manufacturer, returned from Tennessee, is reported as saying:—A syndicate has been formed there, with \$1,000,000 capital, to manufacture coke. This will be the first enterprise of the kind in the south. The company owns 98,000 acres of good coal lands. Concerning the effect this will have upon the coke industries of Western Pennsylvania, he said it would be very injurious, as it would cut off a large territory that has always looked to Pittsburg for its supplies.

The Nelsonville coal and coke company, whose works are at Happy Hollow, in the Hocking valley, Ohio, have just completed machinery for washing their slack, and are now ready to make a good coke. This is the only coke works in the Hocking valley, but owing to the impurities of the slack used in coke making, the coke has not been a good fuel. With the new machinery the quality of product will be greatly improved.

At the new plant of the Central Connellsville coke company, at Tarr's, Pa., 104 ovens are completed while the second 100 are about half-finished. The Connellsville *Courier* says: It is the intention of the company to erect fifty new houses for their men, all to be of brick, and each having to it half an acre of ground. No expense is being spared to make this plant a model in the region, and when completed it will be manned throughout with American workmen. The works will be known as the Rock Island works.

LABOR TOPICS.

Strikes are no longer numerous.

Coal is reported of good quality, near Mt. Shasta, California.

The coal business is in a flourishing condition in Indiana at present.

In the alleged coal conspiracy case at Toronto, the parties have been held for trial.

The co-operative coal mining concern at Brazil, Ind., is to be sold out under foreclosure.

At Winnipeg, Manitoba, anthracite coal is worth \$9 to \$9.50; bituminous, \$6.85; and Lethbridge at \$6.50 on track.

Leavenworth, Kansas, is expecting a large increased trade in coal when the new road to Kansas City is completed.

The new C. W. & V. shaft at Streator, Ill., is now down over 70 feet and will be compelled to go but little further before striking coal.

The Hungarians are leaving the anthracite coal regions for the agricultural districts in Manitoba, under the leadership of Count Esterhazy.

Mr. H. E. Colton does not seem to think there is a first class coaling coal in Tennessee, to judge by a recent letter on the subject to the *Iron Age*.

The Pennsylvania road has just placed orders for 2,000 additional freight cars. Of these 400 will be constructed at their Altoona shops, 200 cars will be built by Berwick company, 200 by Allison, of Philadelphia, 200 by the Watertown works. The balance will be built by other concerns in the state. The Baltimore and Ohio road is in the same category with regard to rolling stock. They have placed orders for 1,000 cars with the car works at Milton. The Pittsburg and Western have also ordered 2,000 freight cars. The Impetus in railway equipment is not confined to the Pennsylvania district.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

A RIVAL OF KEELY.

John Weltner and His Perpetual Motion Machine Invented at the Cost of a Farm and Years of Labor.

Fayette county, Pa., has produced a rival of Keely, the perpetual motion crank, in the person of John Weltner, a resident of the southern part of the county. John has taken preliminary steps to secure a patent on his alleged invention, being fully satisfied that his discovery will work a complete revolution in the mechanical world. He calls the machine the perpetual lever motion, and the fine working model he has on exhibition is said to be a wonderful piece of mechanical work, made up of springs, wheels and shafts. The wheels are serrated; the teeth are placed at an angle of 45 degrees, and the slots into which they fit are cut to the same angle. A pressure will be applied to one of the principal wheels by a series of spiral springs, the result of which will be to cause the teeth of the wheels to slip into the slots and cause a continual revolution of the main or driving wheels. He claims that a source of power can be thus furnished which can be readily applied for running any kind of machinery. The invention is the development of years of toil. Weltner thinks there is a vast fortune to be made out of his newly discovered principle of creating motion and power.

About two miles from Cheat river on the road leading from the "Line Ford" to Morgantown, W. Va., is the farm on which John Weltner toiled in his younger days, and where he first conceived the idea that he was born to invent a machine asserted to be impossible of construction by all scientists. The farm lies at the head of a valley and from its situation is well adapted to all the various departments of agriculture. It seems to have been scooped out of the surrounding hills as it slopes from three directions towards the miniature gorge that leads northward to the river. At the central part of the farm, on the right bank of a small stream, and a short distance from the road, the house stands. It is a substantial two story frame structure, at one time a spotless white, but now weather beaten and gray, the shingles on the roof have decayed and become loose, and the winter winds, as they sweep up the valley, make them clatter with a dismal sound. Bricks have fallen off the chimneys and lie scattered over the dilapidated roof. The panes of glass in the windows are loose, the fence broken and the gate rickety. Everything about the premises shows the ravages of time and the results of neglect.

Water settled here many years ago, and the war, and worked industriously, making his farm a model in the community. He was of an inventive turn of mind, and whittled out many little mechanical contrivances with his jack-knife when a boy. When he grew older, he built a still-house and made all the machinery used in it. Many other works, the ruins of which may yet be seen on the farm were constructed by him. Everything went well with the management of his farm until about twenty years ago, when he conceived the idea of making a perpetual motion machine. The idea seemed to flash upon him suddenly and habits of life and business underwent a marked change. He no longer took pride in raising fine crops, good stock and keeping his farm neat and orderly. He procured the work of old clocks, wheels, springs, etc., and set to work. He toiled almost day and night for months and years and at last he had the machine ready to start. Inviting in his friends he set the contrivance in motion. To the surprise of all the machine kept moving for several days, at the end of which time, however, it suddenly stopped, short, like Grandfather's Clock, "never to go again."

The machine was constructed on no clearly defined principle, but consisted of arranging the wheels one within the other, the motive power being applied by a wheel and axle. A potato attached to the cord that passed over the axle served as a weight. When the machine stopped, Weltner attempted to explain to his friends that the potato was not of the right weight to operate the machine, and after a proper weight was secured it would run all right. His attempts to secure the weight were futile. The partial success of his venture encouraged him to attempt another machine. He ceased to pay attention to his farm and everything about it began to show signs of mismanagement. Materials for the manufacture of a new machine were purchased and he devoted all his attention to it. Business was neglected and his once beautiful farm and home were eventually sold at sheriff's sale. He moved to Fayette county, Pa., and has continued to work on the great problem during all these years with a persistence worthy of success.

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PUBLISHED EVERY SATURDAY

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FOR THE WEEK ENDING

SATURDAY, OCTOBER 30, 1886.

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BUSINESS PROSPECTS.

The past week has witnessed a slight falling off in the volume of trade, but has witnessed also changes of an encouraging nature. It was but natural to expect that after the large increase in the volume of business during the past few months, that a slackening would intervene between the fall and winter trades. Besides this the weather thus far has been unseasonably mild, and it is not improbable that the approaching election may have something to do with the pause in business. This view is strongly supported by the fact that while the volume of transactions has noticeably diminished during the past few weeks, stocks in every raw material are small and growing smaller, manufactured articles continue to advance in price and manufactures are thus stimulated to a degree not witnessed during several years. Labor is everywhere fully employed, especially in manufacturing circles, and strikes are seldom heard of. The outlook is, therefore, on the whole, encouraging, notwithstanding the temporary unfavorable sign noted above.

Whatever doubts may have been entertained in the past regarding the revival of business must now be dispelled. That we are in the midst of a revival of industrial activity is now clear to every one; but opinions may differ as to the length of its existence. There are those who argued two weeks ago, when trade began to fall off, that the increase in the volume of business and the advance in price had both about reached their maximum. It would be difficult, however, were it even desirable, to furnish proofs in support of this view, although it may be conceded that the length of the present period of activity may depend largely upon contingencies yet to be decided. The election to be decided on Tuesday next will have some bearing on the future of business. A congress is to be elected, and if the Morrison free traders find encouragement in the result of the election it is safe to assume that a tariff agitation will assist in unsettling business within the next year. It was not until congress adjourned and the free traders were for the time being defeated that confidence in the future of business could be established, and there is nothing perhaps so well calculated to destroy that confidence again as the resumption of that agitation. This is not likely to begin before the first session of the congress to be elected next week, but it is not impossible that Mr. Morrison and his associates, should they feel warranted in the result of the election, may even attempt a tariff reduction scheme at the short session this winter. Upon this and other like contingencies is likely to depend largely the question of the permanency of the present business revival. Should the country fortunately escape the reopening of the tariff agitation and have any reasonable assurance next year that the industries of the country will not be again attacked at the opening of the new congress, a year or two of unexampled business prosperity may follow. The conditions are ripe for it and the indications at present are all favorable.

Perhaps the most reliable indicator of the country's present prosperity is the increase in imports, as compared with those of last year. Imports have always been greatest when the country has been most prosperous, and the present revival is marked by a large increase in the import trade, although this is by no means as great as the advance in domestic production.

The total number of failures in the United States last week was 198, against 149 the previous week, 146 a year ago, 234 in the corresponding week in '84, 209 in '83 and 141 in '82. The total in the United States from January to date is 8,096, against 8,994 in a like portion of '85, a decline of 998. In '84 the total to date was 8,717, or 612 more than this year; in '83 it was 7,817, and in '82 it was 5,677.

ANNUAL LABOR REPORT.

The HERALD is indebted to Hon. Joel B. McCamant, chief of the state bureau of labor statistics for a copy of his report for the current year. Excellent as have been the other reports of the gentleman since he entered the office of the secretary of internal affairs, the present volume exceeds them in completeness of scope, thoroughness of work and general utility as a book of reference. In addition to the usual statistics on labor affairs, it includes the reports of the state mine inspectors, the latter elaborately illustrated. There are also very interesting papers, with evidently carefully collated statistics, on the Philadelphia training

and technical schools; review of the textile industries for 1885; the glass and window industries of the Juniata valley; cylinder or window glass; iron and its products with valuable tables concerning labor, wages and production. Lumber, paper, leather, clay, breweries, distilled liquors, street railway labor and miscellaneous manufactures are all exhaustively treated. The testimony of employees is particularly interesting. In this particular Mr. McCamant commends the working of the system of obtaining statistics by what are termed "company blanks," which legally require operators and others to give correct information to enable the state of Pennsylvania to publish a true report. By these blanks, in the matter of anthracite coal statistics alone, he has been able to give a report of the trade, which more accurately than in the general run of government reports approaches the actual state of affairs. What Mr. McCamant has to say in the line of argument or suggestion on labor affairs is full of interest and will bear consideration by employers and employees.

The great desideratum, says a cotemporary, is a good and true gas meter that cannot be manipulated by the gas company. It may seem easy to measure gas; theoretically, the gas meter of the day is an automatic measurer that won't record an error and cannot be made to deceive. But many people believe that as a measurer, good and true, without partiality or favor, the meter of the day is wholly unreliable—that is, on the consumer's side. Just now the New York people are greatly excited over this matter. It is alleged that the cheaper the gas per 1000 feet the higher the consumer's bills. Nor is this mere assertion, because abundant facts are adduced to prove the statement. So some method or plan is getting to be urgently demanded that will do justice to consumer and manufacturer. Right at this time the developments before the late senate committee about the Washington gas light company are somewhat startling. It is asserted that only about \$50,000 was paid in to make the capital of this company some thirty years ago, and yet for years it has been paying enormous dividends on millions of capital! The true inwardness of this financial success is asserted to be a skilled knowledge of the proper methods of mixing coal and water gas and forcing the compound through the meter. Evidence was adduced before the committee to show that the result complained of in New York was reached in other localities—the cheaper the gas the higher consumer's bills.

One of the most practical and interesting steps in the movement for enlightening labor is about to be undertaken by Assembly No. 80, K. of L., of McKeesport, Pa. This is the proposed plan to lease a mine, build and equip a fleet of craft and a steamer, and enter upon the mining, shipping and marketing of coal. The primary object, of course, will be to better the condition of labor; but under that is also a desire to enter fully into the coal business, so as to learn by this means its cost, methods, bookkeeping, system of tolls and towage, etc., so that in future action they will not be guided by the dictum of others, but be able to speak from actual business experience.

THERE is a rumor in circulation at Wilkes-Barre that the Democratic coal operators of that section will unite with the Republicans in the combination to defeat Black at the coming election in order to get even with Governor Pattison. J. H. Swayer and Colonel Cunneen announce in an interview their hostility to Pattison. They say that Pattison is endeavoring to crush the state's great industry, and that the safety of the coal trade, both for capital and labor, lies in a judicious output of the mineral.

It is reported that the Pennsylvania railroad company has appointed Monday, November 1st, as the day for the formal opening of the Schuylkill Valley extension between Hamburg and Pottsville, thus completing the link between the Schuylkill coal field and Philadelphia. The new road is already in operation between St. Clair and New Boston, where it connects with the Lehigh Valley railroad.

Someone writes to the New York Daily News, under the head of "Down with the Coal Gamblers," and tries to show that anthracite coal could be sold at a profit at \$2.50 per ton wholesale, or \$3.49 at retail. There is no greater fool than he who tries to write upon a subject that he knows nothing about.

ABOUT COKE.

Process Pursued in Its Manufacture and the Figures of Its Cost.

All those interested in coal mining and the manufacturing of iron are aware of the growing importance of coke as a fuel; comparatively few persons have been so situated as to undertake the inquiry, whether the process now in almost universal use in this country is good, bad, or indifferent; still fewer, perhaps, after ascertaining the enormous waste in our present way of producing this important fuel, are able to suggest a remedy. To do something in this direction, is the object of this paper. Of course, in the space that can be accorded to it in the *Journal*, we can scarcely do more than glance at the most important points.

How is coke produced at present? We mine the coal, leaving from 30 to 40 per cent of the seam in the mine as pillars and waste, when in most places the removal of very nearly all the coal would materially cheapen the cost per ton—not to speak of other incidental advantages of a more rational mode of mining, such as better ventilation, shorter tramways, and a better chance to apply coal mining machinery. The coal so mined is dumped into coke ovens that are bad, cheap copies of the ovens in use in Europe thirty or forty years ago. The coal is "burnt" to coke, and the gases escape into the air unused; from the construction of the oven, it is impossible to utilize them for any purpose; during the "burning," 15 per cent., sometimes even more, of the fixed carbon of the coal is consumed. When we examine a plant of 100 ovens, and find them stretched 1400 feet long; when we see the imperfect and, in a great many cases, the slovenly means used to close the apertures of the ovens to prevent the access of air to the red-hot coke after the gases have been expelled, we wonder that the loss of fixed carbon is not greater. The great length of the plant makes efficient supervision almost an impossibility. When the coke is finally done, a stream of cold water is turned into the oven to cool the coke; the heat of the oven accumulated during the burning of the charge, instead of being utilized for the next charge, escapes with the steam into the air. That the sudden contraction of the masonry consequent on the injection of the water, repeated every 48 or 72 hours, makes frequent repairs necessary, and causes loss of time, goes without saying. The coke is then drawn out by hand. If cars for transportation are at hand, it is wheeled by wheelbarrows into them; if not, it is wheeled to the edge of the cooling-floor and piled up by hand. When cars come, it is handed again.

The writer produced, a few years ago, 29 specimens of coke from different works, all of good repute in the market. The average of the ashes from these specimens was 12.75 per cent. If we assume that 4 per cent. is a fair average of ash due to impurities forming an integral part of the coal used in coking, then the remainder of the ashes found in coke forms another count in the indult of the present process.

Let us examine this unnecessary amount of ashes closer and see where it will land us. In the Connellsville region, 1.6 tons of coal give a ton of coke, or so it is claimed. Then the unavoidable 4 per cent of ash of the coal should give 6.4 per cent of ashes in the coke; instead of that, we find 12 per cent and over. Now, this difference in the amount of ashes between what is and what should be could be being 6 per cent., means first a proportionately greater number of ovens to produce the same quantity of actual fuel; it means an increased cost of the fuel in handling it; if the coke is freighted to near or distant market, it means increased freight; if the coke is used for ore smelting, it means increased flux, increased slag, increased labor, lessened capacity of the furnace! We will try to give the value of this difference in dollars and cents:

In a plant of 100 ovens, there will be 6 more ovens necessary to produce the same amount of actual fuel. They cost at \$250 = \$1500.	
Interest—not to mention repairs—at 6 per cent. =	\$90
The product of 100 ovens being annually 10,000 tons, and the cost of labor per ton 40 cents, gives total labor = \$16,000, 51.2 per cent of this additional for unnecessary ash =	\$8190
Freighting the product, 40,000 tons, to a distance, at \$2 a ton = \$80,000; 6 per cent, for unnecessary ashes =	\$4800
	\$5850

These ashes mean, therefore, forty-eight hundred and fifty dollars on the product of 100 ovens, or 14.62 cents per ton to the consumer. Data are lacking for estimating the increase cost per ton of iron with such coke; but what with extra flux, extra slag, increased labor, and lessened furnace capacity, it can be no less than 30 cents a ton. So far the ashes. When we compare our present coking process with what it ought to be, and can so easily be made to be by avoiding unnecessary loss of fixed carbon, utilizing the gases, and applying simple labor-saving machinery, we find the case still worse.

During a journey undertaken by the writer a few years ago, to gain information on the coke question, he found at the mines of a celebrated steel-works on the continent of Europe, a plant of coke-ovens that had then been in use three years. The coal was carefully watched and the ovens that had then been in use three years. The coal was carefully watched and the

ashes in the coke were only 41 per cent. The loss of fixed carbon of the coal in coking was only 1/3 per cent in ordinary working, against our loss of 15 per cent in the bee-hive oven. We have seen that the avoidable 6 per cent of ashes in the coke add to the cost of it to the consumer at the distance 14.62 cents. How much will the difference in the loss of fixed carbon add? The avoidable loss of carbon being 14 per cent, and the present price of coke at the ovens \$1.60, the loss amounts to 22.4 cents a ton. The force employed at a plant of 100 bee-hive ovens producing 140 tons daily is 26 men; their wages are \$51. By using a different oven, applying simple machinery, using appliances for handling the coke, which have given such splendid results at our anthracite mines, at least one-half of this labor can be saved, or 18 cents a ton.

Recapitulation:	Cents.
Loss due to ashes.....	14.62
Loss due to waste of carbon.....	22.40
Loss due to waste of labor.....	18.00
	55.02

Fifty-five cents a ton on the product of 100 ovens = \$22,000 loss.

Loss on a ton of iron using 1 1/2 tons of coke per ton of iron:

Loss by ashes, carbon, labor.....	Cents.
Loss by increased flux, etc.....	65.75
	98.75

On a furnace product of 40,000 tons the loss is \$39,500! Is it not about time to call a halt and see whether we can not do better?—*Engineering and Mining Journal*.

Pittsburg as a Railroad Center.

Pittsburg is a great railroad center and so impresses the visitor. One hundred and twenty passenger trains arrive and depart each day. Every 24 hours 2,000 loaded freight cars enter and 1,000 loaded freight cars depart from Pittsburg and Allegheny. There are ten street railways, with a motive power of 1,700 horses and mules. In the year '66 the street railways carried 6,230,000 passengers, while in '85 the number carried was upward of 24,000,000. Not only is Pittsburg a great railroad center, but, situated at the point where the Allegheny and Monongahela form the Ohio, its facilities for water transportation are very great. Four thousand three hundred and twenty-three vessels, with a tonnage capacity of 1,705,504 tons, and 3,500 persons are constantly employed. The capital invested is about \$9,740,000, and the yearly value of the work of such transportation amounts to in the neighborhood of \$2,600,000. The manufacturing industries of Pittsburg and Allegheny give employment to about 102,000 persons, receiving wages amounting to \$30,000,000 per annum. The capital invested is about \$130,000,000, and the value of the yearly product \$182,000,000. Under such circumstances, the introduction of natural gas into Pittsburg is one of the greatest importance, and any predictions as to an ultimate revolution in manufactures and trade by its use must appear visionary. A general introduction of this gas as a fuel in Pittsburg, even with its present manufacturing, will save a consumption of coal amounting to 3,000,000 tons per annum, and in connection with the saving of labor in the handling of coal and cinders in and about the mills and furnaces, will reduce the yearly cost of iron, glass, etc., over \$5,000,000. Some conception of the future use of natural gas may be gathered from the fact that, even at this early stage of its use, it last year affected the bituminous coal output to the extent of 2,000,000 tons.

Relative Value of Natural Gas and Coal.

Of Pittsburg coal 55.4 pounds contain the same number of heat units as 1,000 cubic feet of natural gas. With coal at \$1.20 per ton, 1,000 feet of natural gas would then be worth 31 cents. But by tests made by the Westinghouse Electric and Manufacturing Company, 1.18 cubic feet of natural gas evaporated one pound of water from 190° Fahr., with the same boiler under which one pound of the best coal evaporated 10.38 pounds of water. That is, one pound coal equals 12.25 cubic feet of gas, or 1,000 feet gas equals 81 2/3 pound coal. This difference results from the expenditure of heat necessary to raise solid fuel to the gaseous state, which must be done before combustion can take place. In a house grate the loss on this score from using coal would be more than in a large furnace or a factory. Hence, the greater economy in the use of natural gas is in houses and small establishments.

The sinking of trial and prospecting shafts on the Broad Mountain, between New Boston and Gordon has proved that there is plenty of good coal there, in regular seams. Directly south of Frackville and east of the old Whipoorwill workings they opened out the Skidmore and Buck Mountain seams, both seams on both dips—south by west of town they have the Skidmore and Buck Mountain in quality and quantity to compete with the same seams in any part of the coal regions, while all along the property as far west as the head of Gordon Plane, they have smaller seams, and the Mammoth in excellent quality twenty feet thick. Quite a party of the people interested were up there recently. Among them were Fred. Mercur and T. W. Morris, of the Lehigh Valley company, J. C. Hayden, of Jeaneville, Francis Robinson, of New York, and a number of Lehigh mining superintendents.

Inspection and License Laws.

We are much pleased to note that the mechanical press are taking up the question of inspection and license laws. This is evidence that our efforts to enlighten the public, by recording monthly, the disastrous work of incompetents in charge of steam boilers, is bearing fruit, that will eventually result in laws that will protect life and property, do tardy justice to a large body of intelligent men, who have waited too long for protection in the exercise of their profession. We reprint the following from a recent number of the *American Machinist*, as evidence that our contemporaries are realizing the importance of our raid on the "Boiler Bunch." Accounts of boiler explosions come along with great regularity; carelessness and incompetency, in nine cases out of ten, seem to be at the bottom of them, yet it seems impossible to make much progress towards remedying the trouble by extending the operation of license and inspection laws. The frequency of such catastrophes may have something to do with the failure to secure attention to the proper remedies, for it seems that it must be a lack of attention to the subject that prevents the universal application of remedial laws. We do not believe that if by any means the attention of every man in the country could be turned in the proper direction for ten minutes, there would be any lack of suitable action in the matter. There is really no good argument against such laws. Comparatively few men who have use for steam boilers know much about the supplying the tanks of engines to that of this matter, see the advantage of inspection by those competent to judge of their condition. It would often save them serious trouble and expense, and always give them a greater sense of security. So far as license is concerned there is no intention to set up a monopoly. All that is required is that an engineer possess sufficient knowledge and intelligence for his duties; how this is obtained is immaterial. No honest man would desire to put a boiler in charge of an incompetent man, thereby endangering life. The enactment of general inspection and license laws, and their enforcement, are measures against which no fair-minded man will be likely to argue.—*Stationary Engineer*.

Gas for Locomotives.

The Philadelphia company is arranging to pipe gas into the yards of the Pennsylvania railroad company, into a big reservoir that is to be put up there for the purpose of supplying the tanks of engines that are to be built to be run by natural gas. "The scheme is perfectly practicable," said an officer of the Philadelphia company recently. "It has been said the gas is so volatile that no tank can be constructed that will hold it. This is all nonsense. We shall demonstrate not only the practicability of confining the gas, but the fact that it may be used as a fuel aboard engines so cheaply, that in a short time no locomotive running into or out of this city will use coal. It was held two or three years ago that artificial gas could not be used to illuminate passenger cars. The Pennsylvania railroad is using nothing else in its trains on the Pittsburg division, and with the new cars the supply of gas is so abundant that the road will not be very long in showing the other railroads of the country that it will run locomotives more cheaply than they can hope to. As it is now, the coal bills of a company are the biggest items of outlay in the exhibit of expenses. It takes nearly a bushel of coal to run an engine a mile. This is when the locomotive is in motion. Frequent stops and starts increase this item slightly. The gas will be infinitely cheaper. Engines will of course have to be furnished with tanks. These will be so arranged with the compressors as to contain very large quantities of the gas, so that no accident or unexpected delay will be sufficient to sap entirely the supply as to embarrass the movements of the engine." The details of the plan will be more fully set forth as soon as possible. The matter has been discussed by some of the best mechanical engineers of the country, and nearly all of them think it practicable. Engineers on this division are only run as far as Aitona."—*Pittsburg Commercial Gazette*.

Magnesium is an element which has several times been tried and abandoned as a source of artificial light. It now, however, appears likely to come into use again, as a process has been discovered whereby pure magnesium can be economically prepared by electrolysis. At the works in Bremen, where the manufacture is conducted, prizes have been offered for the construction of a magnesium lamp, with clockwork mechanism. Light from this source is perfectly steady, unlike the arc electric lights. By its means colors—even the dark blues and blacks—may be distinguished at night. If the new process of preparing this metal is as successful as promised, it may before long be used for lighting mines, for which it is much better adapted than electricity. Wires in mines are bad, and if any accident happens to the dynamos or main wires, the whole mine is suddenly left in darkness. Moreover, there is danger to the men from the wires. The magnesium light approaches very much nearer the color of daylight than that from oils, candles or gas, though it does not equal the electric light. It gives off no noxious vapors. Several kinds of magnesium lamps are made. In some a wire or ribbon of the metal passes through the flame of a spirit-lamp to insure continuous combustion. In others the magnesium is used in the form of dust and fed to a flame. The light has been used for photographic purposes, both in rooms and under ground.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

What Pump Will Suit?

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following questions in next issue:

What is the best and handiest pump proposed to be put into a dip heading from pit eye 350 yards, to pump, say, 100 gallons per minute 400 yards further in the heading and force it back also to the pit eye? The dip at 750 yards from pit eye being about 12 to 14 yards, the seam is $5\frac{1}{2}$ ft., and the pit is 40 yards deep. Would it be cheaper to take steam from surface or put small boiler in heading? Please state size of pipes, &c., in replies.

Yours, &c.,

S. G. D.

Pittston, Pa., Oct. 26, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer.

SIR:—I send you a few questions on ventilation, in the hope that some of your correspondents will be good enough to give proper answers to them:

1. If a regulator is required in a mine, where should it be placed—nearer to the intake end or return end of the current, and why?

2. If a rise-place making gas is ventilated by air-troughs or wood or iron pipes, should the air go in or return by the pipes, which are, of course, generally smaller than the roadway itself?

3. Under what conditions would it be better to ventilate a mine by blowing in the air than by exhausting it, and where is there a mine that is ventilated by blowing in?

Yours, &c.,

STUDENT.

Streator, Ill., Oct. 18, '86.

Effective Brake.

Editor Mining Herald and Colliery Engineer:

SIR:—I wish to fix a good and effective brake to a pair of winding engines 25 in. cylinders and 4 ft. stroke. The engine winds from two seams at depths of 168 and 211 yards respectively, having drums of different diameters to suit, viz., 8 ft. and $1\frac{1}{2}$ in. and 10 ft. and 23 in. Windings per day, say, 500; weight of carriage, with full tram, about 3 tons. If any of your correspondents would give me their opinion as to the cheapest and best brake for this purpose, I should feel much obliged. I am tied to putting the brake between the drums (space 14 in.) on a separate ring. I have already tried wrought iron bands on wooden curbs, but find them wear out in a very short time, and consequently become expensive.

Yours, &c.,

F. W. A.

Archbald, Pa., Oct. 20, '86.

Interesting Formulae.

Editor Mining Herald and Colliery Engineer:

SIR:—In answer to "J. H. D.," question 1. Modulus, $\frac{1}{2}$. Proportion, 3 to 5 for engine.

$85^2 = \frac{W \times 40 \times 4 \times 3}{7854 \times 15 \times 3 \times 40 \times 5}$ ∴ weight of water in lbs. equals

$\frac{5674 \times 5 \times 7854 \times 15 \times 3 \times 40 \times 5}{40 \times 4 \times 3} = 83389-1056$

lbs. of water = 8338.9 gallons = total number of gallons in 120 fathoms of pipes. But the pumps travel 40 feet per minute. ∴ They deliver 643 gallons per minute.

∴ $D^2 = \frac{643 \times 144}{7854 \times 40 \times 6 \times 25} = 471-56$

∴ $D = \sqrt{471-56} = 21-7$

inches diameter of pipes.

3, 1200 yards dips 1 in 5. Endless chain 40 lbs. per yard. Wheel 64 feet, geared, 31 to 1. Speed of chain 25 miles per hour = 4400 yards per hour. Hutch on every 25 yards equal

$\frac{4400}{25} = 176$

hutches on chain,

$176 \times 12 = 2112$ cwt.,

$\frac{2112}{20} = 106$

tons per hour,

$$\frac{1200}{25} = 48$$

hutches on each side.

$$48 \times 12 \times 112 = 64512 \text{ lbs. of coal.}$$

$$\text{Chain } 40 \times 1200 = \frac{48000}{112512} \text{ lbs.}$$

total on full side.

Empty side

$$48 \times 4 \times 112 = 21504 \text{ lbs.}$$

$$\text{Chain} = \frac{48000}{69504} \text{ lbs.}$$

50 tons on full side, and 35½ tons on empty side. Steam pressure 40 lbs. ∴ $P \times D^2 \times S \times 7854 \times 3 \times 5 \times \frac{1}{2} = W \times v \times h + \frac{1}{2} \times \text{circular of wheel} + f \times \text{circular of wheel} - W \times v \times h$. $40 \times D^2 \times S \times 7854 \times 3 \times 5 \times \frac{1}{2} = 112512 \times 2 \times 8 + (50 \times 60) \times 14 + (35 \times 60) \times 14 - 79504 \times 2 \times 8$. ∴ $D \times S \times 73-27682 = 166242 \cdot 4$. $D^2 \times S = 2268 \cdot 69$. Observe that S is the distance the piston travels in feet.

$$\therefore D^2 = \frac{2268 \cdot 69}{3 \times 2} = 378 \cdot 115.$$

$$\therefore D = \sqrt{378 \cdot 115} = 19 \cdot 4$$

in. diam. nearly. Friction = 60 lbs. per ton, $v \times h =$ vertical height by one revolution of the wheel \times by weight = gravity.

Yours, &c.,

M. D.

Houtzdale, Pa., Oct. 23, '86.

The Rubbing Surface.

Editor Mining Herald and Colliery Engineer:

SIR:—In answer to "Student," there is less rubbing surface in a circular airway than in any other. Example: Take a square inch. Each of the sides will measure 1 in.; therefore, there are 4 in. of rubbing surface area = 1 in. Now, a circle of the same area diameter =

$$\frac{1}{7854} = 1 \cdot 273236;$$

∴ diameter of circle = to a square inch =

$$\sqrt{1 \cdot 273236} = 1 \cdot 128 \text{ in.}$$

circumference =

$$1 \cdot 128 \times 3 \cdot 1416 = 3 \cdot 5437248 =$$

rubbing surface of circular inch difference = $\cdot 4562752$.

2. Each side is 10 ft. Therefore

$$10 \times 4 = 40 =$$

rubbing surface;

$$9 \times 2 + 7 \times 2 = 32 =$$

rubbing surface; difference = 8 ft. The method of putting in brickwork: If possible build of the solid bottom, and protect the building with timber until there is no danger of shots striking it. If the pressure of the gas is great there must be taps left for it to escape, which can be done at pleasure until the tension is off. The effect would be dangerous and destructive to the building if no provisions were made.

Yours, &c.,

J. R.

Drifton, Pa., Oct. 25, '86.

Corrects a Formula.

Editor Mining Herald and Colliery Engineer:

SIR:—Permit me to call your attention to an error which appears in your MINING HERALD for October, page 364, under the head of "Practical and Theoretical Mining." Question 63.

$$24^2 \times 7854 = 452 \cdot 3904$$

and not 352-3904 as appears making the H. P. 274 for one engine and 548 for two.

Yours Truly,

E. B.

Seranton, Pa., Oct. 26, '86.

Wants the Horse Power.

Editor Mining Herald and Colliery Engineer:

SIR:—The gradient on a certain incline is 9 degrees. It requires 2' 20" to hoist a loaded trip. Assuming that an aggregate weight of 29,600 makes an average trip, what is the horse power of the hoisting power, which is a water wheel?

Yours,

J. P. L.

Carbondale, Pa., Oct. 25, '86.

Breaking the Mining Law.

James Heaton, insider superintendent, and Hugh J. Early, "bottom man" at the Philadelphia coal company's colliery No. 4, at Lost Creek, Pa., have been arrested for violation of the mine laws. The arrest, which is looked upon as very important by the miners, was made at the instance of Mine Inspector Stein and upon the complaint of the men employed at this colliery. The trouble arose concerning the hoisting of the men out of the slope at quitting time. The law provides that when ten men, which is the limit, arrive at the bottom, they shall be given a cage and hoisted to the surface, instead of which, it is alleged, a conveyance has been refused unless twenty-four men were on the bottom. The offenders were placed under \$500 bail each for their appearance at court. D. P. Brown, general superintendent of the company, became their security.

THE JERSEY CENTRAL.

The Difficulties it is Encountering Through its Monied Entanglements.

It is now reported that instead of assessing the stock the Jersey Central receivers intend issuing certificates to pay off the floating debt, overdue interest and other claims. The claims and counter claims of the Central and Reading will have to be settled, however, before the organization of the former road will be completed. The Central has a claim for rental and materials and the Reading has claims for betterments. The accountants show that each is indebted to the other to the amount of several million dollars, but how much they expect to get is not stated. On April 10, '85, the United States circuit court directed the Reading receivers to pay over to the Jersey Central only the net earnings of that concern, which order has been obeyed. The Central company, however, claims full rental, including dividends on the stock up to the present. The Reading company claims it is indebted for rental only to April 10, '85. If this view is taken the Central's claim is said to be about \$200,000 for materials and \$700,000 for overdue rental, total of about \$900,000.

Under the lease the Reading company was to receive stock or bonds for all moneys expended by it in improving or extending the Central's lines, and applied toward reducing the Central's debts. On account of this it has accounts to show the expenditure of nearly \$2,500,000, but when the items came up before the master they were reduced considerably. One bill for \$115,000 for erecting new bridges on the Central was thrown out entirely. Altogether, it was shown that the Reading had received \$400,000 in debenture bonds from the Central for improvements and payments on the debt, and the master ruled the Central was responsible for \$1,600,000 more. This was confirmed by the court.

Besides this the New Jersey court of appeals has decided that the Central had no right to sell out the \$1,000,000 of Reading first series 5 per cent. bonds, and the Reading will demand that they be returned. An arrangement of some kind will have to be made, for there is no way the Central can get back the bonds except by purchasing them from the holders, and the present market price is about 70.

If the Central had its money entanglements with Reading readjusted it could easily straighten out its other obligations. Its floating debt is about \$825,000; it is in arrears on interest, including nearly two years' interest on its debenture bonds to the sum of about \$1,000,000, and it is behind hand nearly \$500,000 on the principal of car trusts and about \$200,000 on the principal of its mortgages. Altogether its immediate debt is between \$2,500,000 and \$3,000,000 exclusive of its claims or obligations as regards the Reading. The physical condition of the property is pronounced by the Reading people to be excellent. The roadbed and tracks are in much better shape than when the lease was made and the bridges are much superior. Some of the equipment have worn out and a portion has been replaced by new cars, while the Reading has supplied the deficiency from its own line.

IMPROVEMENTS.

The clearing up of the cavein at Gilberton colliery, Schuylkill county, Pa., progresses favorably.

The Big Tracey seam at Chamberlain colliery, Tower City, Pa., is producing very fine coal, the seam running fully six feet now.

The managers of the Lehigh and Wilkes-Barre coal company, Pa., Wilkes-Barre, will tunnel from the Red Ash seam to the Ross seam, in their Nottingham colliery, No. 15, at Plymouth, Pa. The tunnel will be 7½ feet in size and about 700 feet long. The Nottingham colliery has the credit of the greatest known output in ten hours working, where a single car is hoisted at a time. In that time 1,304 cars were landed on the surface.

Extensive improvements are being made by the Lackawanna coal company at their mine. An air shaft about 11½ feet in size is to be cut through to the seams being worked. The Grassy Island eight-foot seam is being worked, and a bore-hole about 165 feet deep has been put down on the Lillabridge side, next to the Mott's division line. It will be recalled that a slope of this colliery was rendered useless by the breaking in of water some months ago, and now another slope 900 feet in length is being sunk, about 300 yards south of the old opening.

The Newtown colliery at Swatara, Schuylkill county, Pa., a new and small operation, has a force of about fifty men and boys employed, the shipments amounting to 14 or 15 cars per day at this time. The output could be increased somewhat, but for scarcity of cars. The colliery is located on a tract of land owned by P. W. Shearer and is operated by Miesse & Digges. There is only a short distance to the line of the Reading company lands, which gives the operators a very small amount of territory to work on. The lift of the present working is about thirty yards and the seam which is supposed to be the Big Tracey, is about seven feet in thickness.

ALABAMA COAL.

The Extent of Deposits, and the Future of their Marketing.

The following interesting letter is from E. L. Carthell, chief engineer Atlantic and Pacific ship railway, to the editor of *The New South*, Birmingham, Alabama:

I desire to place before your readers a parallelism between the coal measures and products of Alabama, and those of Australia, for the purpose of showing that Alabama coal has a market in prospect that will be of immense advantage to your state.

The following facts are gathered from documents printed under the auspices of the Waterways convention, held at Tuscaloosa in November '85, and from a work entitled "Her Majesty's Colonies," recently published by the colonial exhibition in London.

The coal measures of Alabama lie nearest to the tide water of any in the south and west. They lie on or near waterways that are improvable at comparatively small expense to the Gulf of Mexico. The area of these measures is about 5,380 square miles. They are nearly half a mile in thickness, and they contain every variety of bituminous coal of the very best quality for steam and heating purposes. In '69, the total output was only 11,000 tons; in '80, 600,000 tons; in '82, 1,100,000 tons; in '84, 1,500,000 tons; and in '85, about 2,000,000 tons. In the same region there are also inexhaustible supplies of iron, limestone, fire-clay, slate and copper. By a wonderful provision of nature, coal, iron ore and fluxing material, in many localities, are found in sight of the furnace doors, where they are converted into the products of manufacture. There is literally a mountain of iron extending from Bibb county, in Alabama, to the Georgia state line, a distance of 125 miles. Stretching up into this important mining district are the arms of navigable or improvable rivers that will bear the products to tide water on the shortest possible lines.

Established in the heart of these valuable and inexhaustible natural products, is the city of Birmingham, whose rapid growth has properly given it the name of "The Magic City," and whose manufactured products already amount to 20,000 per day. A network of railroads whose center is here, is rapidly spreading in all directions, connecting this city with the north, east, west and more importantly, with the Gulf of Mexico. This enhanced enterprise and the determination of the new south to retrieve the fortunes and standing lost by an age of slavery, and four years of impoverishing war, can find no better field for the display of those magnificent qualities than in these exhaustless mines of wealth.

The natural market for this coal and iron is to the south—the West Indies, Mexico, Central America and the immense coast of eastern South America. There is, however, not only a successful competitor already in the field, but a possessor of these markets: the enterprise and commercial power of Great Britain has long held them in her grasp, and will continue to hold them until cheaper transportation to tide water will give Alabama products an equal advantage. English coal is put on board ship at \$2.50 per ton; Alabama coal at \$3.50 per ton, but when the improvement of the rivers and the construction of competing lines of railroads will reduce the cost so that coal can be placed on board ship at Mobile or Dauphin island at \$2.00 per ton, then these important southern markets will belong to Alabama merchants.

Australia contains coal measures about equal in extent and amount to those of Alabama. The variety and quality, and proximity to the tide water are about the same. They are both in about the 30th degree of latitude, one south and the other north. The rate of increase of production is about equal, and the present output is about the same, that of New South Wales, the principal coal producing district of Australia, being now about 2,000,000 per annum. The price, however, to tide water in Australia is only \$2.75 per ton on board ship, ready for export to Hong Kong, Japan, Honolulu, San Francisco, Valparaiso and other ports on the immense sweep of coast line washed by the great Pacific, of whose coal markets Australia has a virtual monopoly.

When improved rivers and new railroads shall have reduced the cost of coal on board ship at Mobile, and the Ship railway to the Tidewater at Mobile shall have opened a channel of communication with the Pacific markets, contemplate the immense advantage that the coal producers of Alabama will have over those of Australia! The coal, when on board, ready for export, will cost but \$2.00 per ton, instead of \$2.75 at Melbourne. The distance from Mobile to Valparaiso will be 4,400 miles shorter than it is across the Pacific from Melbourne; to San Francisco, 5,800 miles shorter, and soon to Honolulu, 2,300 miles shorter. The Ship railway itself will offer a very important market for coal to supply its locomotives and other machinery, as well as steamers in transit. These important facts require to be supplemented by no argument to persuade the shrewd and wide-awake business man of the state that their

success is closely and vitally linked with that of Captain Eads. His success will bring to no state such immense benefits as to Alabama, and no city will then occupy such lofty vantage ground as the "Magic City" of the new south.

Not a Success.

The experiment of the Third Avenue elevated road, to demonstrate the practicability of running a locomotive by crude petroleum, was not altogether successful. Steam was first got up by injecting steam into the boiler of water from another engine. A burner, about five inches in diameter, constructed with a double chamber, one chamber containing steam, the other steam and oil mixed, was situated above the grate bars of the locomotive. The tender carried barrels of oil and a tube conveyed the oil to the burner. From one of the chambers of the burner the oil ran through five small apertures of about an eighth of an inch. In the centre of these apertures was a connection from the steam chamber of the burner which terminated in five small tests with apertures of a sixteenth of an inch. Through these apertures the steam and oil were diffused in spray toward the crown sheet and tubes of the boiler, and instantly converted into flame. The failure of the experiment was principally caused by sufficient spray not being admitted into the boiler, consequently the combustion was imperfect. The patentees of the system say they can produce a more intense heat in the boiler by mixing the hydrocarbon and the oxygen so as to form a perfect emulsion. By using oil instead of coal as fuel it is claimed that a train can be run from Harlem to Battery at a cost of fifty cents.

THERE is a strong likelihood that the Pennsylvania railroad company will carry the South Penn and Beech Creek railroad cases, decided against it in our supreme court, to the supreme court of the United States of final adjudication. As the latter tribunal is several years behind with its work, there must necessarily be a long delay before a decision can be reached, and much of the work done on the South Penn line become useless. It is to be hoped, therefore, that if this should be the course taken the minority may abandon the old route and proceed with the construction of the new equivalent road already laid out and for which all the capital necessary has been pledged. Pittsburg needs the new outlet to the West, the manufacturers, its coal and coke, and the new road would be of immense advantage to the Reading system.

A Legal Ton and a Long Ton.

What is known to tradesmen and their customers as the long ton was divested of all claims to legality more than fifty years ago. The statute of 1834, which fixes the ton at "twenty hundreds," cannot be overridden by any trade custom. It used to be habitual among pig-iron men to deliver 2268 pounds of metal for a ton, and in handling coal by weight the ton, in this state, has always been presumed to be 2280 pounds. The recent supreme court decision at Pittsburg merely sets the seal of judicial approval upon a time-worn statute, which is of itself so clear and concise in its terms as to defy all attempts at misinterpretation. Twenty hundreds make one ton, says the legislative degree. Unless changed by the operation of a written contract, an agreement to deliver a ton weight is therefore legally carried out by the transfer of 2000 pounds. If a greater or less weight per ton is desired it must be stipulated in writing over the signature of the party making the delivery.

DOINGS IN COAL.

The coal combination has decided that the output for November shall be 3,500,000 tons.

A. Pardee & Co., are receiving proposals from rockmen to drive a tunnel in their No. 8 slope, at Hazelton, Pa.

Messrs. Leisenring & Co., of Manch Chunk, are preparing to open a number of mines between New Boston and Gordon Plane, Schuylkill county, Pa. For some time past they have been prospecting for the Buck Mountain, Skidmore and Mammoth seams, and have found them equal in thickness and quality to any worked in the region. They consider the test sufficiently satisfactory to warrant them in developing the seams, and will commence operating in the near future.

The Dixon mine of the Fall Creek, Pa., coal company, near here, is now in operation under the supervision of G. M. Springer, employing eighty men. John B. Williams, formerly of the Osborn mine, of Mineral Ridge, Ohio, has charge of the underground work. This is a drift opening into the Lower Freeport seam. The mine is run whenever cars can be had. They are averaging from half to two-thirds time. The miners receive 55 cents per ton for the run of mine coal.

The two large Walston mines, near Punxsutawney, Pa., are in operation, employing a large number of men. They now have a plant of 500 fine large coke ovens, but owing to the ear famine a number of them are out of blast. In addition to running the coke ovens, a large amount of coal is also shipped to Buffalo market. The company are now building a branch road several miles back from Walston where new mines will be opened and several hundred more coke ovens will be built.

WORKMEN IN PARLIAMENT.

Advent of the New Element at the Head of British Politics.

"No one can have watched the leaders of the workmen for the last ten years without finding among them men capable of commanding the attention and respect of the houses of commons, not merely for their eloquence, surprising as that is, but for their good sense, good feeling, and good breeding." Such was the words of Charles Kingsley twenty years ago.

The prophecy has been abundantly verified. Nearly ten years, however, elapsed after these words were uttered ere a workman member was found in the house of commons, though several determined attempts had been made. Mr. Burt, who has occupied a place in the parliament of 1874 and 1880, the late Alexander MacDonald, who was in the house from 1874 until his death in 1881, and Mr. Broadhurst, who was elected in 1880, were the first to wear the honor, and each had commanded the attention and respect of the house of commons, so much so that Mr. Broadhurst was appointed a member of Mr. Gladstone's cabinet. Now that several colleagues have been given to them by the recent elections, the influence of the workman member may be expected to increase rather than diminish.

The advent of bonafide workmen to seats in the British legislature only marks a phase in that vast, though as far as England is concerned, peaceable revolution which will ever be regarded as one of the distinguishing features of the nineteenth century. During the early decades of the century the laboring classes were politically, and in many respects socially, under the heavy heel of a tyrannical or indifferent aristocracy; their voice was unheard or neglected, save when, as in 1832, the voice was raised in connection with the great revolution. Intellectual working classes then were far below the standard of today; socially they had no influence; politically they were regarded as outside of the pale, and unfitted to exercise even the power contained in a vote. The time was a weary one for the laboring man, and justice was apparently slow to make its advent. But delay had its advantages. The workmen of Great Britain received a much needed education in the management of their trade-unions and in many other directions—a training that matured the judgment and self-control of those whose vote in future days will be so powerful for good and ill.

The social and political improvement in the industrial population has been most clearly discernible during the last twenty or thirty years. Fifty years ago a workman would have been ostracized even if he had obtained election to parliament; now he is received there as an equal. Before the reform bill of 1867 the voting power of workmen was comparatively small, and few of the middle classes would have listened to a request for a workmen's representative. Had there been no property qualification to stand in the way of such an election. With the passage of that act the condition of things was changed in the great centers of population. It is not, therefore, a matter for surprise that there should be a wish on the part of those to whom political power has been committed to have a direct voice in the making of the laws in which as citizens they are so deeply interested. Ardently, however, as workmen members might be wished for by their class, a greater difficulty still blocked the way—the want of money to sustain them in parliamentary life. This difficulty has, however, been overcome by the nomination to parliament of the men who are leaders in the unions, and who are being maintained by the funds of the societies.—*Harper's Magazine.*

The Two Sides.

Judge Burke, of Cleveland, sharply and forcibly defines the labor question, so called, of the present day. He says: "Underlying all social systems there are two great principles which the workmen and everybody else must recognize. The first is that the man who is responsible in business, who must shoulder the burdens of any business affair, who must pay the bill, and keep the count running, must have absolute control of that business. He must be able to hire and discharge men as he sees fit and to regulate their wages with each one individually. Any system of society that would fall short of giving this control to a man in any business would soon be chaos. The second thing that must be recognized by the workmen is that there can be no employees unless there are employers. Employers are as essential as employees. Society and business would be impossible without them. These two ideas that I have put in the shape of propositions are fundamental. They reach down to the bottom of our whole society. When they have been mastered and understood as they should be by the workmen of the country, there will be no necessity for strikes or labor uprisings."

In spite of improved draft appliances for locomotives which are now widely known and recognized, some railroads sprinkle their passengers profusely with cinders and cloud them very freely with smoke. While railroad earnings were falling off steadily there was some excuse for postponing needed alterations on locomotives, but that excuse is no longer tenable. It is of more consequence to prevent the smoke and cinder nuisance (where it exists) than to provide luxurious palace cars.

COAL DUST.

INTERESTING AND IMPORTANT EXPERIMENTS TO DETERMINE ITS EXPLOSIVENESS.

How Fire Damp and Blasts Affect It.

From "Transactions of the Mining Institute of Scotland."

(Continued from Page 369.)

The commissioners notice that the removal of dust is practised to some extent, but this can only be a palliative measure, because the still remaining dust will be raised by a shot. In the experiments which have been carried out, the effect of dampness in reducing the inflammability of dust has been often noticed, although the Prussian commissioners state that it requires to be saturated with two-thirds of its weight of water to render it harmless. Mr. Galloway found that any dust used by him was affected by the slightest moisture in the air. If it be rendered sufficiently moist for a distance equal to the length the flame of a blown out shot will extend, so that it cannot be raised by the current produced, there will be no danger of its ignition.

Its removal and the watering of the roadways and other parts of mine will also reduce the augmentation and aggravation caused by its presence in a fire-damp explosion. The high temperature of mines and speed of the air currents cause the water to rapidly evaporate, and attempts have been made to lay the dust by means of hygroscopic substances—such as crude salt and a solution of calcium chloride. The proportion of crude salt found effective in preventing the dust from flying is stated to be nine tons per 500 yards of six feet roadway (about 20 lbs. per square yard), applied once weekly for the first month, and once a month afterwards.

The commissioners discuss some attempts that have been made for the prevention of blown out shots, and have made experiments with Mr. Stephen Humble's blasting plug, the only appliance that seemed to promise any prospect of success. They found that it does not reduce the occurrence of blown out shots, and as the plugs were always destroyed when they were effectively used, they formed only an extravagant substitute for ordinary tamping.

The commissioners were convinced that if shot firing were abolished, or even if existing restrictions in regard to shot-firing were increased in stringency a large number of collieries would need to be closed. Blasting seemed to be necessary, and they were so impressed with the dangers arising from it, when carried out in the ordinary way, that they have made a special study and investigation into the methods of so using explosives as to prevent the development of flame.

Attempts to produce explosives of analogous composition to gunpowder, that would not when fired emit flame, have resulted in failure. This may happen from the fact that gunpowder is not a definite chemical combination; it does not explode in the strict sense of the word, it simply deflagrates or burns with great rapidity.

Dr. McNab was the first to put into practice the idea of extinguishing powder flame by tamping over the shot a long cylinder filled with water, which, at the moment of explosion, would burst and quench the ignited gases. Experience has shown that this method enables the workmen to enter their working places very soon after firing, in consequence of the powder gases being soluble in water, but affords no certain security against ignition of an explosive atmosphere.

Suggestions have been made to employ, in connection with powder, solid substances, containing carbonic acid gas for example, which would be volatilized at the moment of explosion, so that the gaseous products would smother the flame. But the exposure to heat is too short to allow of any decomposition to take place, and the solid bodies are, to a great extent at least, scattered from the shot hole in an unchanged condition.

The commissioners had experiments made by Mr. Galloway on a mode of employing dynamite in connection with liquified carbonic gas. The firing of the shot shattered the reservoir containing the liquid, the dispersion of which, it was thought, would take place with sufficient rapidity to extinguish any incandescent sparks that might be thrown out. Of six of these cartridges which were fired in Bute Merthyr colliery, four gave no indications of flame; but in two cases sparks were distinctly visible. The method could not be relied on for complete extinction of sparks, and as a much simpler and more economical plan of securing the same results, by porous water tamping, suggested itself to Mr. Galloway, these experiments were no further pursued.

Nitro-glycerine has a proportion of oxygen in excess of that which is required for the complete combustion of the carbon which it contains, and the

combustion of the hydrogen and carbon which it contains, and its perfect metamorphosis should not result in the formation of flame; and probably this consideration induced the commissioners to make experiments with explosives of which it forms the base. In the open air it burns with a feeble flame, and when detonated a lightning-like flash is seen; used in a shot-hole it would probably give sparks by heating to incandescence dust or portions of the tamping. In the form of dynamite, that is when it has added to it about one-third of its weight of a porous non-combustible earth, its detonation causes sparks from the heating of particles of this porous material. The temperature of these sparks is sufficiently high to ignite an explosive mixture of gas and air.

Although high explosives, that is, explosives of the gun cotton and nitro-glycerine class, are available for stone work, they are so rapid in action and exercise such a shattering effect as to be inapplicable when used in the ordinary way, to the working of coal. Early in 1873, Mr. Abel conceived the idea of distributing the greater force developed by the detonation of high explosives over a greater area by means of a column of water in which they might be exploded, and in this way so modifying their shattering action as to assimilate their disruptive effects to those of gunpowder. He foresaw that the water which distributed the force would also be available for the quenching of any sparks that might be produced if the shot happened to blow out. Trials carried out at Garswood with water cartridges on this principle showed that the action of dynamite was entirely modified, and that the coal was brought down in large masses with the formation of very little dross, but sparks were, in a few cases, distinctly seen.

The results, however, were so encouraging that the commissioners had special experiments carried out by Mr. Galloway at Bute Dock, Cardiff. Shots were fired from a hole four feet deep in a heavy building of granite blocks, into an explosive gas mixture, which was contained in a canvas cube four feet square and four feet deep. This cube was provided with proper appliances for mixing the air and also for testing its composition.

The dynamite charge, fitted with detonator, was enclosed in a waterproof wrapping. The wires or fuse were placed for protection in the groove of a lath which passed through a bung. The charge thus fitted was inserted into a cylinder of sheet zinc or other material capable of holding water. The cylinder was then completely filled with water, and a bung, through which the wires passed, was forced $\frac{1}{2}$ inch into the mouth of the cylinder. This space of $\frac{1}{2}$ inch was filled with plaster of Paris, and when it had set the charge was ready for insertion into the hole.

M NAB SYSTEM.

Of 6 shots with powder, 6 to 8 oz., 24in. to 26 in. water tamping, 4 fired gas.

A REL SYSTEM.

Of 8 shots with powder, $3\frac{1}{2}$ to 6 oz., 24in. to 30in. water cartridges, 6 fired gas.
Of 42 shots with dynamite, 3 to 4 oz., 24in. to 30in. water cartridges, 8 fired gas.

As 66 per cent. of the powder shots fired on the M'Nab system, and 75 per cent. of those fired in water cartridges ignited the gas mixture, while only 19 per cent. of the dynamite shots fired from water cartridges produced inflammation, it follows that although dynamite shots in water cartridges do not give absolute immunity from ignition of gas mixtures they would diminish in an important degree the risks attending blasting in mines.

TO BE CONTINUED.

A Coal Mine on Fire.

Volumes of smoke were seen to rush from the air shaft of the Mount Carmel colliery, at Mt. Carmel, Northumberland county, Pa., Tuesday morning, and the report that the mine had taken fire caused hundreds of men, women and children to rush to the head of the slope. For a time there was indescribable excitement, which was finally allayed by the official statement that all the miners had made their escape, and that the flames had originated in one of the airways through which steam pipe descended to the pumps of the lower workings. The woodwork of the airway was quickly destroyed, and the flames then laid hold of the Mammoth seam. Notwithstanding the choking smoke the miners fought the fire heroically, and at last reports it was under control, with a prospect of extinguishing it in a few hours. The mine is operated by Thomas M. Righter & Co., and is one of the largest in the district.

The only deposit of jasperized wood in the world is said to be that in Chalcedony Park, Apache county, Arizona, which F. A. Tridle, formerly governor of that territory, and an eastern company, are endeavoring to develop. The wood is of various shades of red, and aggregates millions of tons. Out of the wood can be made table tops, paper weights, cane handles, and an endless number of small articles, and it will also be of great value for mosaic work. The wood is distinguished from agate or onyx by its warm, gummy appearance and the diversity of coloring, it being impossible to find two pieces, however small, exactly alike. This makes the wood invaluable for tiling inland work. Some of the pieces selected for exhibition are sections of trees from 15 inches to 3 feet in diameter. These sawed into slabs can be used for table tops.

Sawn into slabs can be used for table tops.

Permanence of the Natural Gas Supply.

A correspondent of *Bradstreet's* writes as follows: Natural hydro-carbon gas has a promise of permanence much more decided than petroleum has. The writer studied the geology of western New York and Pennsylvania forty-five years ago, and saw many gas springs in the shales and overlying drift of the northern slope, utilized at Fredonia in a system of lighting the village, which has continued undiminished since 1854. At Barcelona, then "Portland," the beacon of the harbor was then lighted with the natural gas, and it so continues. All through the shales, limestones and salt-bearing formations of western New York the evidence of its presence was frequent, and its utilization was effected by merely enclosing the natural outlets. Again, in Kanawha, W. Va., the writer examined the geological structure for a long distance in '52, and saw the blowing gas wells then and now utilized for boiling salt. They are reported to continue the gas flow with a pressure very little changed, if at all, thus proving to have a permanence at least for thirty-five years. Over all the great area of the sedimentary formations, from the Alleghany summits westward, it is indisputable that the coal measures proper, with the shales, limestones and oil sands, all yield more or less aeriform hydro-carbons. They exist in vast quantities in some form of partial combination, perhaps, but readily assuming the desired form when the strata are pierced with the drill. The gas is abundantly given where there is no oil, and it is evidently a primary constituent of the earth's mass, and not an organic or secondary product in any sense or in any degree. The oil wells for the first few years yielded oil without gas, and all required pumping to exhaust them. It was only in August, '61, that the flowing wells were discovered, with their prodigious force of gas and oil mixed in various proportions. It will not do to derive general laws relating to either from these exceptional manifestations. No conditions of storage can exist which account for the vast quantities of gas delivered from thousands of these wells drilled within the last twenty years. We need not go behind the external and evident facts to refute the assumption that this is a short-lived phenomenon, soon to be followed by the exhaustion of "an abandoned coal mine." There are no conspicuous instances of reduced production, and the practical problem of reducing an original force of 500 pounds to one of such moderate force as to make the delivery economical and safe is really the only difficulty yet experienced. The experience of all coal mines and all salt borings is ample proof of the constant generation of hydro-carbon gas, and it is every where almost interchangeable in form with the lighter petroleum. Great quantities of oil volatilize on exposure, but beneath the surface the presence of water appears most readily to facilitate it.

Locomotive Engineers.

The exercises of the twenty-third international convention of the Brotherhood of Locomotive Engineers were held in the Metropolitan opera house, New York, on the 20th of this month. The convention was attended by locomotive engineers and their families from all parts of the country, and the *American Machinist* says that a more picturesque, enjoyable and profitable meeting could not be imagined. Excellent music, speeches of high order, and good will to all was the rule of the hour. The address was delivered by the Hon. W. H. Grace, Mayor of New York; Gov. Leon Abbott, of New Jersey; Rev. T. De Witt Talmage; F. M. Arthur, Grand Chief Engineer; and Hon. Chauncey M. Depew. All speakers agreed that it was proper for laboring men to organize and protect their rights and resist all ill usage and oppression by incompetent men, and intimated that if organizations by workmen who are governed by the motto adopted by the Brotherhood, namely, "Sobriety and truth, justice and morality, defense, not defiance, reason and law, victory," would certainly obtain all their just demands, and very quickly too, without resorting to strikes. It was further declared that organizations governed by such a wise leader as their Grand Chief Arthur would be beneficial to the employer, employee, and the country at large. In these times of strife between capital and labor, we believe that the remarks by the Hon. Chauncey M. Depew were fitting and most happily made, and command attention not only by those who hold the same views, but should also be carefully considered by those who at present look upon labor organizations with disdain. In the course of his remarks he said: "I believe that all railroad presidents in the country, who, when the engineers have anything to say and knock at their doors, will dismiss all others and admit the engineers and give them attention." This is a high tribute to the Brotherhood, and which they well deserve.

The Grand Union hotel, New York city, has published a useful little memorandum book which will be mailed to any address on receipt of a 2c stamp.

Address, "Advertising Department," GRAND UNION HOTEL, New York City.

Southington (Conn.) Knights of Labor have decided to form a corporation with a capital of \$25,000 to manufacture entery. They will put the Knights of Labor stamp upon their goods. A large amount of stock has been taken, and work will be begun as soon as possible.

Saved as possible.

TRADE REVIEW.

THE COAL TRADE.

The late rains and a slight increase in the capacity for moving coal have given the coal operators a better opportunity to get their coal prepared and forwarded to market. The observance of religious holiday on Monday and the election on Tuesday threw shipments back a little, but increased activity and push since is bringing the totals up. There is no falling off in the demand although the year's output to Nov. 1st was 26,035,198 tons, as against 25,347,587 tons in '85, and 25,055,601 tons in '84, an increase of almost a million tons. Dealers and consumers at the east begin to realize that the shipping season is nearing its close and that whatever they do in the way of replenishing stock must be quickly done if they would avoid the advance in freights which is impending.

Dealers in the west report ready sale for all the coal they can get forward. The experience of last winter has taught them and their customers the wisdom of laying in their supplies before the snows begin to blockade roads and while cars can be had for transportation. This western demand for anthracite coal has grown with amazing rapidity and to such proportions that neither producers or transporters are prepared to meet it. It is an important factor in the trade and is offsetting to a considerable extent the inroads of bituminous coal and natural gas.

A meeting of the coal managers is to be held in New York city on the 15th inst. One of the topics on the program for discussion is a proposition to increase the prices for the different grades of coal. It is also intended to take action in regard to the transportation rates on the different railroads. On the advisability of advancing prices there is a diversity of opinion. The strongest argument presented by those who are in favor of a raise is that it would put the market in a stronger position before the usual winter decline, but others say it would make the drop appear greater than it really will be. The Chicago retail dealers have advanced prices 25 cents. The Philadelphia line and city trade is at its height, and every car the Reading has is fully employed, while the other companies are also taxed to their utmost. Prices are regarded as satisfactory.

The total amount of anthracite coal sent to market for the week ending Oct. 23, as reported by the several carrying companies, was 774,567 tons, compared with 792,138 tons in the corresponding week last year, an decrease of 17,561 tons. The total amount of anthracite mined thus far this year, is 25,578,092 tons, compared with 24,730,954 tons for the same period last year, an increase of 847,138 tons. The following statement gives the gross tonnage of each of the leading coal carrying companies for the week ending Oct. 23, and for the year to same date, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R. R.	313,688	1,466,100	10,904,430	1,561,664
Lehigh Valley	150,803	5,751,710	5,404,796	1,136,914
D. L. and Western	123,628	4,054,024	3,900,559	1,513,425
Shamokin	14,863	676,918	806,722	1,122,874
Und R. R. N. J.	43,622	1,346,410	1,391,495	42,085
Penna. Coal	41,210	1,185,633	1,097,540	1,48,093
Del and Hudson	93,554	3,277,894	3,043,063	1,234,811
Pa and N. Y.	48,053	1,636,716	1,431,968	1,201,748
Clearfield Pa.	52,757	1,749,353	2,328,123	1,057,575
Hon and B Top	12,954	535,267	600,000	1,35,243
Nor. and W. Va.	13,359	658,359	466,659	1,221,730

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Oct. 23, was 297,838 tons, of which 224,881 tons were coal and 72,957 tons coke. Of this weekly tonnage 223,054 tons originated on the main line of the Pennsylvania railroad while the remainder originated on its branch lines. The total tonnage for the year thus far has been 12,057,743 tons, of which 9,287,429 tons were coal and 2,770,314 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending October 30, was 312,000 tons, of which 31,900 tons were sent to and 35,500 tons shipped from Port Richmond, and 33,000 tons were sent to and 32,500 tons shipped from Elizabethport. Vessels are reported in fair supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights at \$85c. and discharge to Boston.

The shipments from the mines of the Connecticut

coal region for the week ending Oct. 23 were 67,282 tons, and for the year to that date 1,967,266 tons, a decrease of 276,192 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—week, 51,822 tons; year, 1,539,307 tons; decrease, 75,988 tons. To Pennsylvania railroad—week, 4,294 tons; year, 204,952 tons; decrease, 130,119 tons. To the Chesapeake and Ohio canal—Week, 11,166 tons; year, 223,009 tons; decrease, 70,104 tons.

Chicago.

From the Industrial World.

The situation in the coal market is very much the same as it has been for some weeks past, only it is more close, and country merchants are getting more anxious to see their supply of anthracite come in. Shippers and dealers are hampered just as much as ever, if not more so, for the want of coal, occasioned by the scarcity of cars. Prices are remarkably firm, and we hear on every hand that considerably more than the card rates is being paid, often as high as 50 cents in advance being received from dealers who are particularly short on their stocks. Instances where 25 and 30 cents are paid over the card rates for small egg are quite numerous. Nobody seems to be able to solve the problem as to when the time will come when receipts of anthracite will be ample. To illustrate the general situation of affairs, we will mention the fact that one dealer who last year received 150 cars for a given period in this month, was only able to get 8 cars during the same time this year, while his orders for the latter were considerably larger than the former. Receipts by lake are slow, and freights from Buffalo are steady at \$1.

Bituminous coal is quite active, and is moving more freely. Prices are firm.

The coke trade is without change in demand or price.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.	
Per gross ton by carload, 2240 lbs	
Grate.....	\$ 6 15
Egg.....	6 15
Stove.....	6 45
Nut.....	6 45
Lehigh Lump.....	8 40
No. 4.....	6 75
Per net ton by carload,	
Grate.....	\$5 50
Egg.....	5 50
Stove.....	5 75
No. 4.....	6 00
Nut.....	5 75
Lehigh Lump.....	7 50
BITUMINOUS.	
Erie & Briarhill.....	\$4 35
Pittsburg.....	3 25
Indiana Block.....	2 65
" Slack.....	1 25 to 1 35
" Nut.....	1 65 to 1 80
Baltimore & Ohio.....	3 00
Hocking Valley.....	3 00
Youghiogheny.....	3 25 to 3 35
Wilmington.....	2 10
Blossburg.....	3 25
Cumberland Smithing.....	3 60
Southern Smithing.....	3 60
Crane Creek.....	2 00
Fountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Minook.....	2 00
Morris.....	2 00
CANNEK.	
Kanawha.....	4 70
Buckeye.....	4 20
COKE.	
Connellsville Coke.....	4 75 to 50
Crushed Coke.....	4 75 to 50
Charcoal, carload per bu.....	8 1/2 to 8 3/4

Pittsburg.

From the American Manufacturer.

Prices of coal are higher at Cincinnati, Louisville and New Orleans, and at the first two cities named stocks have become quite small. With these exceptions there are no changes to note. There continues to be too little water in the Ohio to move boats, and on this account there is but little mining being done along the Monongahela. The quantity ready to ship is estimated at from 8,000,000 to 10,000,000 bushels.

Prices remain as follows:

PRICES AT PITTSBURGH.	
River, wholesale, on board.....	31 1/2 to 41 1/2 cts. per bushel.
Railroad.....	41 1/2 to 45 cts. per bushel
AT CINCINNATI.	
River, wholesale, on board.....	7 to 8 cts. per bushel.
AT LOUISVILLE.	
River, wholesale, board.....	7 to 8 per bushel.
AT NEW ORLEANS.	
River, wholesale, on board.....	26 to 28 cts. per bu.

Bushels are rated among dealers here at 76 lb.—26 1/2 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

Cincinnati's coke demand continues very large. The only complaint is on account of the continued scarcity of cars. If coke could be shipped fast enough additional furnaces would be put in blast here and there: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Trade outlook is bright everywhere.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Oct. 30, 1886.

	Week.	Year.
	Tons.	Tons.
Shipped North.....	72,580-14	1,941,087-08
Shipped South.....	68,166-07	2,263,684-11
Total.....	140,747-01	4,194,771-08
For corresponding time last year.		
Shipped North.....	69,945-07	1,946,895-15
Shipped South.....	79,606-06	2,103,255-94
Total.....	149,551-13	4,050,150-19
Increase.....		5,989-19
Decrease.....	8,804-12	144,620-05

Pennsylvania Coal Company Shipments.

Following is the report of shipment of Pittston coal for the week ending Oct. 30th, 1886:

Shipped East to tide.....	21,899-07
" " Local points E. M. & Erie.....	5,089-19
" " West via L. S. & Erie.....	11,206-05
Total.....	41,192-11

MINING NEWS.

The miners at the Enterprise colliery, Mt. Carmel, Pa., have been granted the 10 per cent. advance in wages asked for, and a strike at these works is thus averted.

The men at Lawrence colliery, near Gilberton, Pa., experience considerable annoyance from the surface water on the mountain rushing down the cave holes, and finding its way down into the mines.

The cylinder heads of the fan engine which supplies the air for the miners in the Holmes seam at Draper colliery, Mahanoy City, Pa., blew out on the 28th, necessitating a stoppage of work in that seam for several days.

A new seam of coal was struck last week at No. 6 Trescow, Pa. The seam is six feet thick, and underlies the old seam at a vertical depth of 187 feet. In has a pitch of twenty feet. The intention of the company is to sink a new slope at once. The coal is of a good white ash quality.

The Mahanoy City *Tri-Weekly* says: "Superintendent Scott has had men tunneling for the Buck Mountain seam at Mahanoy City colliery for some time past and was rewarded by striking it, the coal being of most excellent quality and the seam of unusual thickness. This find gives Mahanoy City colliery three fine seams, the Skidmore, Sevenfoot and Buck Mountain beside the bottom split of the Mammoth, and insures many years of profitable working."

Thirty-five white miners have gone to work in the Conesville, Ohio, mines at the reduced price, 75 cents. The strike was started on April 15, and the miners have been idle ever since. In the meantime the operators of the adjoining mines of Coalport imported fifty negro miners from Richmond, Va., some of whom were persuaded by the white miners to return to their homes, the white miners paying their railroad fare. At present only negro miners are working in the Coalport mines, but the white miners are willing to go to work if the negro miners were not working.

The Rochester mine of Bell, Lewis & Yates, at Du Bois, Pa., is running almost full time, but not up to usual capacity. This is one of the largest shipping mines in that part of Pennsylvania. Previous to the strike, over 600 men were employed there, and as high as 2,200 tons of coal has been loaded from their tipple in ten hours. At the present time 520 men are employed about the works who have had very fair work the past two months notwithstanding the car famine. This firm also handle all the coal mined at Reynoldsville, Walston, Beech Tree, Falls Creek, Coal Glen and several other mines in this neighborhood. The general headquarters is at Buffalo.

November's Coal Prices.

The Receivers of the Reading coal and iron company have issued the new circular fixing coal prices for November. The following are the line and city trade prices: Schuylkill white ash, at Schuylkill Haven—Lump and steamboat, \$2.50; broken, egg and chestnut, \$2.75; stove and small stove, \$3; pea No. 1, \$1.25; buckwheat, 75 cents. Schuylkill red ash, at Schuylkill Haven—Egg, \$2.75; stove and small stove, \$3; chestnut, \$2.75; pea No. 1, \$1.25. Shamokin white ash, at Schuylkill Haven—Egg, \$2.75; stove and small stove, \$3; chestnut, \$2.75; pea No. 1, \$1.25. Shamokin red ash, at Schuylkill Haven—Egg, \$2.75; stove and small stove, \$3; chestnut, \$2.75; pea No. 1, \$1.25. Lorberry red ash, at Schuylkill Haven—Broken, \$2.85; egg, \$2.95; stove and small stove, \$3.25; chestnut, \$2.85; pea No. 1, \$1.25. Lorberry red ash, at Pine Grove—Broken, \$2.55; egg, \$2.85; stove and small stove, \$3.15; chestnut, \$2.75; pea No. 1, \$1.25. North Franklin white ash, at Schuylkill Haven—Egg, \$2.75; stove and small stove, \$3; chestnut, \$2.75; pea No. 1, \$1.25. Lykens Valley red ash at Schuylkill Haven via canal—Broken, \$2.55; egg, stove and small stove, \$3.35; chestnut, \$2.95; pea No. 1, \$1.85; pea No. 2, \$1.30. Lykens Valley red ash, at Pine Grove via rail—Broken, \$2.75; egg, stove and small stove, \$3.25; chestnut, \$2.85; pea No. 1, \$1.75; pea No. 2, \$1.20.

THE COAL MONOPOLY.

Facts and Figures That Gov. Pattison Has Failed to Grasp.

It is interesting to observe the periodic outbreaks of hostility to railroad companies and other corporate property. The form of attack may be different and the basis of action changed, but the spirit is always the same. It is apparently impossible for ascertain class of persons to treat corporations as they would organized bodies of private individuals, though it is difficult to see why they have not the same rights and are not entitled to the same consideration. Of course the charge of monopoly is always made, and never proven, having less the foundation than ever before, and yet not a month passes but the same new champion of "anti-monopoly" arises and volunteers to rescue the people from their corporate "oppressors." In the meantime, business thrives and flourishes, the country continues to grow and expand, and the great bulk of our people are happy and prosperous.

But we think it was reserved for the past week to witness the most thoroughly groundless cause of complaint. Our readers will understand that we have reference to the manifesto of Governor Pattison of Pennsylvania against the coal companies. Though the result of last year's effort by the same officials in much the same direction is yet in doubt, the attorney general is advised in a letter to him from Governor Pattison to begin legal proceedings against the roads in the coal combination on a set of facts which the governor takes pains to state have been "measurably authenticated."

If it were worth while, many of the so-called facts contained in this letter might be successfully controverted, but we think the inquiry may well be limited to two main considerations, namely (1) whether the coal combination has any of the essentials or characteristics of a monopoly, as charged, and (2) whether there is any basis for the claim that prices of coal as now fixed are extortionate. With these two points clearly established, it will be easy for any light-thinking person to judge what merit there is in the proposed action. What suggested the governor's letter of course was the knowledge that there has recently been some advance in the price of coal. But there has at the same time, owing to the improvement in trade, been an advance in the prices of many other commodities, and we may rest assured that if coal were an article or private manufacture, instead of the product largely of corporate energy, the rise in it would occasion as little remark as that in the other cases. As it is, the advance is regarded much in the nature of a crime, and yet the truth is that the companies had for a long time been practically on a war footing notwithstanding the combination, and that prices had been continuously declining for a number of years, as we shall show below, till finally they got down to a totally unprofitable basis, so that the attempt had to be made to recover a part of the decline.

It is only necessary to refer to this continuous decline in prices to prove that the anthracite coal combination is in no sense a monopoly. Governor Pattison is correct in stating that the combination was formed towards the close of '84; yet in the face of that combination we find prices steadily falling till about July, '86. Now it is clear to any one in the possession of his senses that a monopoly would not tolerate such a state of things—a monopoly is by instinct grasping, and so far from accepting lower profits, is all the time seeking to increase them. Apart from this, however, there is no basis for the charge of monopoly. The coal combination is simply an agreement or understanding by which the companies engaged in the mining or transporting of coal seek to adjust production to the limits of consumption. Such an understanding is absolutely necessary, for without it each company would mine all it could, and as the total capacity is estimated to be nearly 50 per cent. in excess of present consumption, it is easy to see that the result of the policy of unlimited production would be to flood the market with coal and involve all the companies in ruin. The same difficulty has to be met in other industries in the same way. Thus last year the steel rail manufacturers came together, and placed a limit upon the output of rails, and the improvement in that branch of the iron trade really dates from that time. Or take the cotton goods manufacturers, they adopt practically the same course when they shut down their factories and keep their spindles idle for a time. Then there are various other branches and trades where pools or combinations exist. In nearly all cases these are the outgrowth of all necessity, and against none of them is any protest lodged, because private persons and not public corporations are concerned. But the law of supply and demand is as inexorable in the one case as in the other. However reluctant individual

persons or companies may be—and it is well known that many of the members of the coal combination joined the combination only with the greatest reluctance—the law of self-preservation compels it incumbent upon them to overcome their objections and combine with the rest.

But while the combination attempts to regulate production (though only so far as to guard against its being greatly in excess of the probable demand,) it does not attempt to regulate prices. It is true that the recent advances have been made in concert, but that was simply because prices had got so low that raising them was necessary. It was supposed when the combination was formed that by limiting production in the way mentioned, any very great break in prices could be prevented, but such is the natural antagonism among the companies and such was the depression in business, that the decline could hardly have been greater if the combination had not existed at all. The slaughter of prices finally became so great as to all the companies of one mind as to the need for a change, and business having in the meantime improved, when the representatives of the companies came together they were agreed both upon the policy and wisdom of once more selling their production upon remunerative terms—and that is all there is to the recent advance and to the charge of monopoly which it has called forth. A few figures will give point to these remarks. Here is a table showing the average yearly price realized for all sizes of coal from lump to pea inclusive, in each of the years from 1869 to '85 inclusive, together with the average for the first half of '86. Except as to '86, we use the figures of the *Engineering and Mining Journal*, which prepares a yearly record of the same. The prices cover Wyoming and Lackawanna coals free on board in New York harbor:

AVERAGE YEARLY PRICES FOR WYOMING AND LACKAWANNA COAL (ALL SIZES) F. O. B. NEW YORK HARBOR.

Year.	Price.	Year.	Price.	Year.	Price.
1869.....	\$5 35	1875.....	\$ 99	1881.....	\$3 84
1870.....	4 59	1876.....	2 09	1882.....	3 73
1871.....	4 25	1877.....	3 79	1883.....	3 45
1872.....	3 80	1878.....	3 23	1884.....	3 41
1873.....	4 81	1879.....	2 52	1885.....	3 42
1874.....	5 09	1880.....	3 55	1886 (avg.).....	3 42

This shows that the average price for '86 at \$2.76 per ton was lower than in any other year in the record except '79, which latter was the culmination of the previous era of trouble among the companies. Moreover, we find, as said, that combination or no combination, the fall in prices has been continuous and uninterrupted since '81, each year showing a lower price than the year preceding. Thus in '81 the average was \$3.84, or over a dollar more than the average for the six months of '86; in '82 the average fell to \$3.73, in '83 to \$3.65, in '85 to \$3.41, in '85 to \$3.12, and for '86, as already said, the figure was \$2.76. But great though the decline was, that was not the worst of it; the tendency was not still downward, and in one month the average was as low as \$2.68. Clearly, therefore, something had to be done, and clearly also advances (altogether) of 50 cents per ton are not large in view of the previous heavy decline. It is estimated that should all the advances be faithfully maintained, the average for the present month (October) will reach about \$3.25 per ton. Comparing this now with the October result we get the average price in October for the following years: '86, \$3.25; '85, \$3.24; '84, \$3.29; '83, \$3.71; '82, \$3.98; '81, \$3.78; '80, \$3.84. The price for '86 is put down as the probable average, after allowing for all the recent advances.

Prices up to the average for October last year, and consequently, leave it below the figure of all other recent years since '79. Even two years ago \$3.29 was obtained, while in '83 the figure stood at \$3.71, and in '82 at \$3.98—that is, in the latter year the companies got almost 75 cents per ton more than they now propose to ask. Instead therefore, of present quotations being extortionate or exorbitant they are very moderate indeed.

As to the necessity for an advance, we can see that very clearly when we look at some of the effects upon earnings produced by the previous low prices prevailing. It must be remembered that prices were at their worst in '86, and that therefore it will not do to take the results for '85. But the Philadelphia & Reading is the only company for which we have returns for the present year, none of the other coal companies making monthly reports. Still the Reading's exhibit is sufficient to demonstrate what a serious matter the low prices had become to all the companies. We give below the net earnings of the road for August and for the nine months ended with August, and also the traffic movement for the same nine months.

RAILROAD AND COAL AND IRON COMBINED.

Profit and Loss.	Net Earnings.		Traffic, December 1 to August 31.	
	August, Dec. 1 to Aug. 31.	Coal Mined.	Coal Shipped.	Merchandise Shipped.
1881.....	\$ 1,928,280	2,063,138	2,063,138	1,231,926
1882.....	1,436,441	1,992,486	1,422,944	9,528,889
1883.....	1,067,621	1,770,992	4,284,921	8,615,043
				7,806,173
				1,838,732

From this we see that the August net earnings of the Reading have in a period of two years been diminished one-half—they were \$1,928,280 in '84 and are only \$1,067,621 now, and this is in a month, too, when a partial advance had already been effected in the price of coal. Let it be supposed, however,

that this month's result is exceptional, note that for the nine months that have elapsed of the company's fiscal year, the net for '86 are only \$7,170,992, against \$9,136,208 in the same nine months of '84. These results, too, were in face of the fact that the traffic of the road (according to the figures in the table) increased very decidedly, both passenger and merchandise, and also that the company mined and carried more tons of coal than it did two years ago. We are unable to carry our comparisons further back, since the Central of New Jersey was not in the years preceding. It follows, therefore, that the Reading has suffered not from a loss of business, but from a loss of profits. What the main reason for this loss of profits has been may be gathered from President Keim's remark that a corporation could not go on forever operating at a net loss of 42 cents per ton, and that after losing so much money it was about time that the Reading began to make some.

Altogether, we think that neither charge of monopoly nor of exorbitant prices is substantiated by such facts and figures as these; and while it is hardly to be expected that those interested in arriving at a different result will accept the conclusions reached, the managers of the coal companies may rest assured that their policy has the approval of the great body of the business public.—*N. Y. Commercial Chronicle.*

The Secret Service of the Post Office Department.

We have just examined a copy of "The Secret Service of the post office Department," by P. H. Woodward, formerly chief of the post office detective corps. No one man in the United States is better qualified to write a book on detection in the post office department than Mr. Woodward, who not only has had fifteen years' experience in ferreting out robbers of the U. S. mails and bringing them to justice, therefore having a most complete knowledge of the subject, but gives by his brilliant and glowing description a fascination which the reader is unable to resist, and is compelled to follow the words of the writer as he leads from one account to another, forgetting the lapse of time and only stopping when the book is finished.

As to the delightful style of the writer is added the thorough truthfulness of every incident, and each character being drawn from life as the author came in contact with the person described, what more can one ask?

The best detectives in the United States have been engaged in the cases described in this book, and while the sketches are clothed with all the charm of romance, they rest from beginning to end upon the solid rock of fact.

It gives a complete description of the many means and complicated contrivances of the wily and unscrupulous to defraud the public.

Among the most interesting cases is the well remembered one of the "Star Route" frauds, in which Mr. Woodward performed the chief part in collecting evidence against the conspirators and in trying to bring them to punishment.

The book is profusely illustrated with two hundred superb engravings made expressly for this work by well known artists, which, together with the enchanting style of the writer and the elaborate and beautiful cover make a truly magnificent volume.

We would like to quote a few incidents from this fascinating book to show some of the many methods used by the thieves to escape detection; and also the equally ingenious devices of the detectives, but space forbids that, therefore we leave the book in the hands of the reading public, confident that it will have an enormous sale, and congratulating its reader upon the entertainment it will afford him as well as the knowledge he will gain by it of this important subject.

The book is from the well known publishing house of Messrs. Winter & Co., of Springfield, Mass., which is a sufficient guarantee that it is a work of sterling merit, and can only be obtained through their authorized Agents. We cordially recommend it to the notice of all, and confidently hope that it will have a good sale amongst us, as the price has been placed so low as to bring it within the reach of every one.

INDUSTRIAL PROJECTS.

A company is being organized at Knoxville, Tenn., to start an iron foundry.

The Chatagay ore and iron company will erect a second blast furnace at Plattsburgh, N. Y.

The Ketchum iron company—capital stock, \$15,000—has been chartered at Fort Smith, Kansas, to establish a foundry and machine shop.

The Hudson river ore and iron company has purchased the Cold Spring (N. Y.) furnace, which will now be started up again, after being idle several years.

The St. Louis *Age of Steel* says: "A factory for the production of machinery and edge tools, principally the latter, will be opened in this city in the course of a few weeks. A new process of manufacture will be employed."

The Lion Iron works, Birmingham, Ala., are now working on the heavy castings and furnace supplies for the Pratt coal and iron company's furnaces. One of these castings requires 80 tons of molten iron,

PRACTICAL AND THEORETICAL MINING.

QUESTIONS AND ANSWERS PREPARED WITH A VIEW
TO ASSIST APPLICANTS IN

Obtaining Certificates of Competency for the Positions
of Fire Boss, Mine Boss, Mine Inspector,
Etc., Etc., Etc.

BY ROBERT MAUCLINE, EX-INSPECTOR OF MINES

Entered according to Act of Congress in the year 1885, by J. S.
Kirkwood & Co., in the office of the Librarian of
Congress, at Washington, D. C.
POWER OF MACHINERY.

Question 65. (2).—With an indicated pressure at the boilers of 80 pounds per square inch, what should be the diameter of the steam cylinders.

Answer.—The load to be lifted from the bottom is 8-08 tons, = 16,160 pounds. If one engine is on dead centre, the other must be able to start the load. The circumference of the drum at the left is

$$14 \times 3.1416 = 43.9724$$

feet, therefore the rope travels with the load 43.97 feet, while the piston travels 10 feet. We have, therefore, the simple proportion

$$\frac{43.9724 \times 16160}{10} = 71040.39$$

pounds, the total force required on the piston to overcome the net load, and this divided by the effective pressure on the pistons per square inch will give their area.

Assuming $\frac{1}{2}$ of the boiler pressure to overcome friction, loss between boiler and cylinder and to compensate for area of piston rod, &c., the average pressure may be assumed at 40 pounds per square inch. Therefore the area of the piston should be

$$\frac{71040}{40} = 1776$$

square inches; this would be a cylinder whose diameter is

$$\sqrt{\frac{1776}{.7854}} = 47.5$$

inches.

3.—Allowing time for changing cars, at top and bottom and in getting up and slacking off speed, with an average piston speed of 400 feet per minute, how much coal would these engines hoist in a shift of 10 hours?

Answer.—The circumference of the small end of the drum is

$$14 \times 3.1416 = 43.9724$$

and the circumference of the large end is

$$23.7 \times 3.1416 = 74.4559;$$

therefore, the average circumference, and lap of rope will be

$$\frac{43.9724 + 74.4559}{2} = 59.216$$

feet each revolution.

$$\frac{1600}{59.22} = 27 \text{ feet}$$

revolutions for each hoisting, and

$$27 \times 10 = 270$$

which the piston has to travel for each run. A speed of 400 feet per minute is

$$\frac{400}{60} = 6.6$$

feet per second, and

$$\frac{270}{6.6} = 40.9$$

seconds is the time required for each hoist.

If we allow 49 seconds for changing the cars and in getting up and slacking off speed, we have a total time required for each hoist of

$$41 + 49 = 90 \text{ seconds} = 1\frac{1}{2} \text{ minutes,}$$

which would be equal to 40 hoists per hour or 400 in a day of 10 hours. The load is 6 tons, therefore, the full hoisting capacity is

$$6 \times 400 = 2400 \text{ tons}$$

in a shift of 10 hours.

4.—What is the horse power of such engines?

Answer.—The cylinders are 47.5 inches = 1776 square inches area. The average piston speed is 400 feet per minute, and the average effective pressure is 40 pounds per square inch.

$$\frac{1776 \times 400 \times 40}{33000} = 2679 \text{ H. P.}$$

in each cylinder and

$$2679 \times 2 = 5358 \text{ H. P.}$$

while at that speed. As the engines are less than half the time in motion their continuous power for a day is about 2000 horse power, and the actual power of the engines may be called 5 thousand horse power.

Question 66.—How would you construct the brake on hoisting engines at collieries?

Answer.—The proper type of "brake" would depend on the power and speed of the engines. For powerful engines, at high speed, I would prefer a steam brake with iron band and lined with wearing segments all round the brake ring; and for engines of moderate power and speed, I would prefer block brakes acting on a segment of the brake ring and operated by a hand lever.

The bands are in halves, one over and one under the drum, attached on the opposite side of the drum from the engines by adjusting screws, to regulate their length. The other ends are jointed on opposite sides of the centre of motion of the lever; therefore, both are tightened or slackened by the one motion of the lever. The band by encircling the drum spreads the pressure and reduces its intensity per unit of surface, lessening the compressive and torsional strain on any given point of the drum; it also gives full contact and conducting surface to carry off the heat generated by friction; but the motion of the band in tightening or slackening is at right angles to the radius, therefore it requires considerable motion of the lever to produce any effect by the band on the ring. This is an advantage where steam is used to operate the bands, because steam acts suddenly and amplitude of motion imparts elasticity, relieving the brake of the sudden jerk caused by the steam piston. With hand levers this is a disadvantage. If the engineer has to move the lever through an arc of 7 or 8 feet to tighten the brake, it is too slow to be efficient.

With a block brake, the whole pressure is concentrated on a segment of the circle, requiring strong brake rings to prevent distortion and fracture. The limited conducting surface may be apt to cause heating, but a short movement of the hand lever is sufficient to tighten the brake. The block moves nearly in the direction of the radius, therefore a movement of $\frac{1}{2}$ of an inch will apply or release the brake, therefore a movement by the hand of the lever of 3 feet or 36 inches will multiply the leverage 288 times. With such a brake if the engineer apply a force of 50 pounds on the end of the hand lever through an arc of 3 feet, he will apply a pressure of 7 tons on the block, because

$$36 \times 8 = 288,$$

and

$$\frac{14,400}{288} = 50 +$$

pounds. As friction is independent of the extent of surface in contact, when the total pressure is the same, the block brake is equally efficient as a brake. Block brakes should be under the drum, so that the pressure upwards will reduce instead of increase the weight upon the drum shaft, and consequent friction of the journals in the pedestals.

Question 67.—Explain what form of "safety catch" you prefer, and why, as compared with others?

Answer.—Would prefer the catch now generally adopted in the anthracite coal regions of Pennsylvania.

These catches consist of eccentric sectors or cams, having their faces serrated or toothed like a saw, keyed on shafts, which are placed across the top of the cage frame, one on each side of the guides; a spiral spring around the shafts throw the cams inward against the guides, the springs are held back by connecting rods or chains attached to the main suspending clevis, which connects the rope and cage, therefore the weight of the cage is the force which holds back and prevents the springs from acting.

If the rope or chains should break or even slack from the cage resting, the cams are thrown in, the teeth bite into the timber, and the weight of the cage, acting through the cam shafts as a fulcrum, wedges them tight by forcing the increasing throw of the cams between its centre of motion and the grip. The guides being caught on both sides cannot split or be forced out of position. Another form of catch consists of wedge blocks, inserted between the guide and the sides of the guide shoe, with the narrow end upwards, having springs or levers to force them up tight when released by the breaking or slacking of the rope. The wedges forced upwards by the springs and the downward motion of the falling cage, wedges the blocks between the shoe and the guide and holds the grip. But if the guides are coated with ice the wedges have not sufficient friction to catch or break the crust, and allow the cage to jam itself tight on the guide, therefore I would not be in favor of using them, especially in down-cast shafts in winter.

Pointed bars working against ratchets and sharp faced cams have been tried with the view of catching quick before the descending cages acquired momentum; to tear or break the guides, but they are found to split and destroy the guides or are broken by the sudden jerk, and are consequently obsolete at well appointed collieries.

Question 68.—Give your views as to whether the so-called safety catches are or are not a safety appliance.

Answer.—In England, where all the coal is raised through shafts, statistics prove that during eleven (11) years only one (1) life was lost by the breaking of ropes for very five and one-half million tons of coal raised. Data from the same source, shows by analysis, that a man may ride down and up a shaft on a

cage, every day in the year, Sunday included, for 6,849 years, before meeting with a fatal accident from this cause. And although riding in shafts must be acknowledged as dangerous, still we think that a form of safety catch which can reduce this ratio of danger must be very near perfection.

Where the cage speed is moderate and its weight heavy, in proportion to the load, then the danger from descending on the empty cage can hardly be taken into account, but with heavy loads, light cages, and high speed, the case is very different.

In deep shafts, with an average speed of 27 to 30 miles an hour, in the middle of the run, the cage speed may be 50 and in some cases 60 miles an hour.

With a lightly constructed steel cage, the weight of the empty cars may be more than half the descending load, and when the cage has only a few men on it, it may be only about $\frac{1}{3}$ of the common descending weight, therefore if the springs of the catches are made just strong enough for the empty cage and car to keep them back, when men are descending the weight may be so much less, that the least ice or roughness on the guide, together with the resistance of the air at high speed, may be sufficient to partly slack the rope and cause the cage to stick long enough for the descending rope to drive it down and snap the rope by the jerk from the slack given out. Of course the springs can be pinned back when men are descending, as has been practiced at some collieries, but there still remains the danger of this being neglected, if the springs are weak enough to be safe for men descending on the cage at a high speed, they will not have force enough to bite into the guides and be efficient in case of accident.

Of course we assume that the rope is much more likely to break with the ascending load, and when the rope breaks, the momentum will maintain the cage an appreciable amount of time before it changes direction, and begins to fall back, thus giving the springs time to act and fasten the cage. If the cage chains break the catches might hold, but if the rope break several hundred feet above the cage and fell on top of it, rope, cage, guides, and all would go the bottom in a heap, and the rope is more likely to break at the top than at the bottom, because its own weight is added to the strain. Cage chains can easily be made stronger than the rope, and are convenient for inspection; therefore with proper care their liability to break is very remote.

All things considered, we incline to the opinion that the safety catch, under ordinary conditions, creates a false sense of security, and we would rather prefer to depend on close inspection and prompt removal of doubtful ropes, than on safety catches. It requires attention to keep them in proper working condition, and they complicate the plant more than they increase safety, and although they have become popular enough to be inserted in the mine law, we have not been able to discover any very good reasons why. Experience in the future will show high speed hoisting, will probably prove that catches are a source of danger instead of safety.

Question 69.—Would you be in favor of using "detaching hooks" on the hoisting plant of a colliery?

Answer.—Accidents from over-hoisting or passing the mark are very rare, therefore they are intended to remove a very remote danger. If the engine was moving slow the rope might detach and the cage hang suspended without further damage, but if the cage was moving slowly, the engineer could stop the engine with the brake before an accident would result.

If the cage was at a high speed by the engineer neglecting or mistaking the position of the load by the indicator, the hook striking the ring at such a velocity, would be more likely to break the detaching ring than to free the rope; if it did detach the rope, the momentum of the cage would still dash it into the head frame, and the result would be a wreck at all events. Detaching hooks must be often cleaned and oiled, the jarring caused by the repeated slacking and tightening of the rope at the lift tends to make the shackle pin wear a dent in the face of the jaws, which must be kept planed off smooth to be efficient; therefore the detaching hook, like the safety catch, is seldom in perfect working order.

The strongest arguments in favor of their use have been advanced by those interested in their manufacture. They complicate the rope attachment and add so little if anything to security of life or property, that I would not be in favor of using them.

(To be Continued.)

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FOR THE WEEK ENDING

SATURDAY, NOVEMBER 6, 1886.

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THE BUSINESS OUTLOOK.

The condition of general business continues to be active and the prospects for the future full of hope. The hum of active industry is heard throughout the whole land and as production increases consumption is augmented until the supply in many branches of trade and manufacture is scarcely equal to the demand. Prices are not advancing rapidly, but nobody complains of this, as it is accepted as an indication of the permanency of the revival of business. Manufacturers especially are pleased with the situation and prospects. They find plenty of demand for their products and a fair promise of advanced prices in the near future. The workmen, also, are satisfied with the situation, as the absence of strikes or disturbances of any kind fully attest. On the whole the situation is better and the outlook for the immediate future more promising than at the same season of any year in the near past.

The result of Tuesday's election is highly satisfactory to the industrial and manufacturing interests of the country, and will go far towards inspiring confidence in the stability of the revival of business which we have been experiencing. Shortly before the adjournment of congress Mr. Morrison gave notice that he would bring up his tariff reduction scheme at the reopening in December. This threat has tended somewhat to check the revival of trade and to prevent speculative enterprise. But the election returns show that the voters of the country, especially of the industrial and manufacturing centres, have concluded to place their seal of condemnation on tariff tinkering and tariff tinkers. Mr. Morrison has been defeated in his own district, where his free trade theories were supposed to be generally accepted, and Frank Hurd, of Toledo, who is another champion of "tariff reform," has been permanently retired from public life. Speaker Carlisle, of the Sixth Kentucky district, narrowly escaped defeat, as did also Sprigler, of Illinois. The result of the election is as gratifying to the friends of American industry and American labor as it is sweeping. It will surprise the friends of protection everywhere, and spread dismay in the ranks of the free traders. Its effect in reassuring the country and promoting business confidence and stability is incalculable, as will soon be made manifest by even a more active era of business prosperity.

In the different branches of trade and manufacture there is no change worthy of especial mention. The iron trade continues to be unusually active, with prices a shade higher and hopes of a busy winter season and increased activity early in 1887. The restoration of confidence likely to result from the emphatic suppression of the free trade heresy will hasten the beginning of a large number of new enterprises that have been projected for some time and which will consume a large amount of iron and steel, as it will also hasten the undertaking of other enterprises which will indirectly create a demand for these products.

The anthracite coal trade is in a most prosperous and promising condition. The demand is fully up to the supply and prices are a trifle higher than heretofore. For the first time in twelve years the miners in the Schuylkill region will receive an advance of one per cent. in wages above the basis, the collieries drawn to furnish prices of coal sold in October showing that the average obtained was \$2.52 per ton, and the schedule is fixed upon a basis of \$2.50. Present indications are that the country will require more coal than ever before during the winter months, and with an average tonnage prices need be no lower than those now ruling. The demand from the west is especially active, the requirements of that section being largely in excess of previous estimates, and cars and coal are scarce at many points. A continued lack of transportation facilities also curtails the output at the mines, but the production is nevertheless large, amounting to nearly 800,000 tons weekly. The total production for the season up to Saturday last was 26,326,554 tons, as compared with 25,575,891 tons up to the closing week in October, '85.

Bituminous coal is being mined and shipped in larger quantities, and prices west and southwest are higher, but at the east there is no noticeable strength in price developing. The talk of a pool on the seaboard trade for next year still invites attention, and the point now being discussed is as to the quantity each district shall be allotted. There are, however, persons interested who think the necessity of restricting the output is not urgent, and who argue that all that is necessary is to agree upon a price and

strictly adhere to it. And it is not improbable that this view may ultimately be adopted, as all present indications point to a largely increased consumption next year.

THERE will be no coal famine in Kansas this coming winter, such as marked the state's history in the early months of this year, to the serious privations and sufferings of citizens. The Canon City coal company has required agents to lay in a two months' supply, which is not to be touched until January, '87. So far the agents throughout Kansas have received and stored away 26,000 tons. To do this the dealers have advanced about \$165,000. Having the means to buy, the residents of the territory covered by the trade dealers of this company are assured of warmth-dealing mineral, let the winds blow and the snowfalls drift as they may.

IT IS NOW THOUGHT that a settlement of the difficulty between the Union and Mineral mining companies of the Shamokin district and their employees will be amicably adjusted and that a strike will be averted. The committee of seven authorized to act for the men have received notice from President Strong, of the Mineral company, saying that he had authorized a comparison of the wages now being paid with those of last year, with a view to submitting the question to arbitration. The committee say this will be satisfactory to them.

RECENTLY a New York girl of fifteen, who had taken lessons in "First Aid to the Injured," was in Fallsburgh, N. Y., when a boy was thrown from a wagon and his leg broken. She at once put her knowledge into use, set the leg, and he is recovering fast. Since we have prohibition on the curriculum of our public schools, why not have a little of this practical medical instruction as well?

A MORE careful study of the coal region maps and less dependence on thieving exchanges would have saved the Lonaconing, (Md.) Review from the blunder of locating the Shamokin troubles in the Ohio district.

THE famous Comstock mine is abandoned, probably for all time. During the last ten years Californians have seen \$270,000,000 worth of property vanish into thin air as the result of the ruin of the Comstock.

A PATENT has been granted to Thomas Connelly, of Phoenix Park, Schuylkill county, Pa., for a device for transmitting steam power from the surface to the inside workings of a mine.

At the next session of the legislature of Pennsylvania, application will be made for an appropriation sufficient to erect three college hospitals for the use of miners in the bituminous coal region.

MINE ACCIDENTS.

David Lewis fell down the shaft at Wm. Penn, Pa., on the 2d and was killed.

A miner named Robert Morrison, was instantly killed in the J. shaft at Braidwood, Ill., on the 25th.

On the 1st a man named McGroarty was instantly killed at the Oakwood shaft, near Wilkes-Barre, Pa.

Sidney Johnson, a miner, was killed by falling slate in the Muchakinock mines, at Oskaloosa, Iowa, on the 26th.

Isaac Morgan, of Pyne Valley, a miner in No. 3 slope, West Brookside colliery, at Tower City, Pa., was killed by a fall of shale.

An ore-bank owned by D. W. Cox, at Dillsburg, York county, Pa., caved in on the 25th, killing two men and seriously injuring several others.

John Polanka, a Hungarian miner, was caught by a fall of slate in the shaft at Morewood, Fayette county, Pa., and instantly killed, on the 25th.

An explosion of fire-damp occurred at the Johnson mine at Seranton, Pa., on the 25th, injuring ten men, one of whom, it is thought, will not recover.

During the month just past twenty-five accidents were reported to Mine Inspector Williams as having occurred within the Wilkes-Barre, Pa., district. Of these seven resulted fatally.

Room is being made for another set of boilers, at the colliery at Middle Creek, Schuylkill county, Pa., and in about three weeks they will be finished. When complete there will be five sets, making in all twenty boilers, all of the latest pattern.

COKE MAY GO UP A PEG.

The Big Demand for Steel Rails Causes an Advance in Price of 40 Per Cent.

The combination of steel rail makers find that the purpose for which it was organized over a year ago at Long Branch, viz., to restrict the manufacture of steel rails to the actual requirements of demand, has been made almost unnecessary by the extraordinary demand for rails. The large amount of railroad building now in progress, and the still greater amount in prospective, places the steel rail trade in a safe and most encouraging position. The price has steadily advanced from \$26.50 per ton a year ago to \$34.50 per ton now as the lowest for large contracts, while for smaller lots as high as \$36.50 to \$37.50 per ton has been obtained. Large orders have been placed in western and Pennsylvania mills for spring delivery. These orders are reported to amount to 50,000 tons. Next spring will undoubtedly witness great activity with the steel makers, as a number of western roads will then be in the market for supplies.

The railroad companies have experienced no diminution in the demand made upon them for transportation facilities, and the Pennsylvania and Reading railroad companies are reported to be refusing local contracts, which require a specified number of cars daily. The car companies are all busy turning out equipment, and are reported to have more orders than they can fill. The Pennsylvania railroad companies will give orders this week for one thousand additional cars, making nearly four thousand cars that have been constructed within the past eight months for that company's account, and increasing the number of men employed in that company's system to 50,000. The Baldwin locomotive works are also busy in every department, and are turning out an average of three locomotives per week. They employ 3,000 hands, and last week to meet urgent demands made sixteen locomotives.

No better evidence of the prosperity of the country is furnished than the enormous demand for fuel. The introduction of natural gas into Pittsburgh, which was a great coal consuming market, and the use of other artificial fuels have not diminished the demand for coal. Bituminous and anthracite are being sent to market as rapidly as possible to meet the demand for them, and so active is the demand for coke that new ovens are being built and put in operation, and the syndicate controlling this article has ordered off all restriction in its manufacture and the ovens will be operated to their greatest capacity. The anthracite producers have been compelled to increase their output for the present month by 250,000 tons; there is no restrictive combination in bituminous coal, and the fuel tonnage of the Pennsylvania railroad company this year will be 2,000,000 tons in excess of that of last year. The greatest need of equipment with the railroads is the transportation of fuel.

Coke trade prospects are correspondingly brighter for all these favorable indications, and an early advance in prices is among the probabilities of the situation. A number of new ovens have been added to the total in this region during the past summer and a number are yet in contemplation. Notwithstanding this, the demand has always been equal to the output, though the entire region has been running full. It is true that the product was restricted several times but the restrictions became necessary on account of a scarcity of cars and for other reasons, not from any weakness in the market or general falling off in the demand for coke. It is expected that this rosy condition of affairs will continue through the coming winter at least. If war in Europe should arise, our manufacturers will have their hands full for some time to come, but aside from any foreign contingency the increasing prosperity of the country and the lengthening lines of railroad must keep up a demand for coke for some time to come.—Connellsville Courier.

Complimenting the Engineers.

The popular reception tendered to the locomotive engineers at the opera house was a worthy tribute to a most deserving body of men. The locomotive engineers, in point of character and brains, not less than in physique, stand in the highest rank of good American citizenship. They are men of something more than common labors or even common machinists; they belong to the class of skilled workmen. In addition to this, the nature of their work makes it necessary that they should possess in an eminent degree the best attributes of our nature—courage, caution, self-control, self-sacrifice, sobriety, fidelity, alertness, decision and good judgment. Nobody in the world has a heavier responsibility laid upon him daily and hourly than the locomotive engineer, and, as a rule, nobody meets and sustains his responsibilities more faithfully and manfully. He faces death in its most cruel and ghastly form, constantly, with a calm and undaunted eye; and upon his skill, nerve and address the lives of the vast traveling public absolutely depend. He must be a man of uncommon ability, and Mr. Depew did not exaggerate when he said that a veteran engineer could probably succeed as a railway president or superintendent as well as on the footboard. The good sense and moderation displayed by

the Engineer's Brotherhood, in their relations to employers and other trades, is entirely in line with their conduct and character in other respects. Chief Arthur is the type of the genuine locomotive engineer. His address was sensible and strong in all points. It would be well for society if all railroaders could rise to the intellectual and social level of the Brotherhood of Engineers.—N. Y. Com. Advertiser.

COAL DUST.

INTERESTING AND IMPORTANT EXPERIMENTS TO DETERMINE ITS EXPLOSIVENESS.

How Fire Damp and Blasts Affect It.

From "Transactions of the Mining Institute of Scotland."

(Continued from Page 377.)

These experiments were followed by others, also carried out by Mr. Galloway, in the Bute Merthyr colliery, in a seam 2½ feet thick. Thirty-three shots were fired altogether, with charges of from 4 to 11½ ounces of dynamite, enclosed in zinc water tubes, 1½ inches in diameter, and from 2½ to 4 feet long. Generally they show that the shattering effect of dynamite was so modified that the coal was fairly brought down, with charges equal to one-third the charge of powder that would have been required; but sparks were seen in the majority of cases, and even with the longest water tubes they were sometimes thrown out from 8 to 16 feet; only in one case was anything like flame seen. The Bute dock experiments showed that the dynamite water cartridge did not give absolute security when fired into an explosive atmosphere of gas and air, but that is a circumstance that cannot often occur; and the more important question remains, will these sparks, emitted by dynamite water cartridges, ignite an atmosphere containing a highly inflammable coal dust, or a mixture of gas and air which is inexpensively *per se* containing coal dust in suspension, which are obviously conditions of much more frequent occurrence?

Shots were fired from a steel block, having a hole 2 inches diameter and 19 inches deep, into a cube similar to what was used at Bute dock. The coal dust employed was of an inflammable character. It was suspended upon sheets of paper over the shot, by which it was at the moment of firing blown into the air.

Shots	Dust.	Per cent. Gas.
2, 2½ oz. dynamite	No dust, No gas, No flame.	
1, 2½, No water or other tamping	No dust, No gas, No flame.	
1, 2½, Enclosed in paper do, do	1½ to 3½ lbs. flame, 15 ft. to 1	
1, 2½, No water, no tamping.	2 lbs., 1½ to 1½ no flame.	
1, 2½, " " " "	2 lbs., 1½ to 1½ no explosion.	
1, 2½, 24 in. by 1½ in. water cartridge	no dust, 5 no flame.	
33, 2½, 18 in. to 24 in. water cartridge	2 to 3½ lbs. 5 to 7 no flame	

These results demonstrate conclusively that dynamite water cartridges, upwards of 18 inches long, may be fired with security as blown-out shots in air containing as much as 6 per cent. of gas, and having an inflammable coal dust in suspension. Out of thirty-three shots fired in this way not one produced ignition. They also show that an atmosphere containing 1½ per cent. of gas, with coal dust floating in it, is ignited by a dynamite shot fired without tamping.

It appears from a few experiments made by the commissioners, and from the investigations of others, that gun cotton, tonite, and blasting gelatine may also be safely used in water cartridges, and that these high explosives may be confidently employed in conjunction with water tamping, that is, with a cylinder of water placed over the separately confined charge.

Blasting	Depth of Hole.	Dust.	Per cent. Gas.
Gelatine	Oz.	Ins.	Lbs.
2½, 12, No water or tamping.	2, 1½	Dust ignited, Flame 15 ft. high.	
2½, 18, " "	2, 1½	Dust not ignited	
2½, 18, " "	2, 1½	Violent explosion	
2½, 18, " "	2, 1½	Dust not ignited	
2½, 18, " "	2, 1½	Dust not ignited	
2½, 18, " "	2, 1½	Flame 20 ft. high	
2½, 18, " "	2, 1½	No flame	
2½, 18, " "	2, 1½	Flame 20 ft. high	
2½, 18, " "	2, 1½	Flame 20 ft. high	
2½, 18, " "	2, 1½	No flame	

On the other hand, blasting powder cannot be used with inflammable dust in the air, or in a gas and air mixture which is in itself inflammable, with any degree of safety, either in water cartridges or with water tamping. Out of seventeen water

cartridges eight inflamed an atmosphere containing dust and gas, and of four shots fired on M'Nab's system of water tamping, one ignited the mixture.

Shots.	Column of Water.	Dust.	Per cent. Gas.
Gunpowder	Oz.	In	Lbs.
2, 12, " "	Unlamped, 1½ to 2,	Flame 8 to 10 ft. high. Great volume of flame.	
1, 12, " "	" "	Dust partly inflamed.	
3, 24 to 32, 12 to 18, water tamping.	" "	Dust not inflamed.	
1, 18, " "	6, " "	6 1/2 lbs. Dust inflamed.	
3, 12, " "	8, water cartridge, 2, 4 to 7, Large flame.	Explosion.	
1, 12, " "	" "	Dust explosion	
2, 12, " "	4, " "	5 to 7, Explosion	
3, 12 to 12, 9 to 12, " "	" "	Dust not inflamed. Sparks projected.	
1, 16, 6, " "	" "	Explosion.	
2, 16, 6, " "	" "	6, Sparks projected.	
2, 24, 18, " "	" "	Dust not inflamed.	
1, 34, 9, " "	" "	Dust not inflamed.	

In these experiments with gunpowder it was noticed that there was a distinct interval between the explosion of the charge and that produced by the mixture of coal dust, gas and air. It was also seen that the water in the cartridges was not in every case thoroughly dispersed, but that it was sometimes thrown out *en masse*, so that it did not produce its maximum effect in extinguishing the flame.

[TO BE CONTINUED.]

Preparing for the Inspector.

The Pittsburgh coal men are preparing for the government commission that will shortly appear to examine into and report the value of the Monongahela river improvements. "We propose to give the board a pointer or two on the commercial importance of the Monongahela river," said one coal operator "that will open their eyes. We propose to show conclusively to the board of engineers that the Monongahela river interests are just as they have been represented. They can see for themselves when they make a tour of the river. The extensive coal works will be pointed out to them, and we will have our books, if necessary, ready to prove the amount of coal that is sent out every year. All of the leading coal operators are prepared to produce volumes of testimony. As to the navigation company, we have no fight with them. The stockholders of that company are some of our best business men, and we don't want them to suffer any loss. We want them to have a fair price for their property, and will do what we can towards enlightening the board of engineers as to the value of the plant. Every effort will be put forth on the arrival of the board here to furnish them with the information desired, and we have reason to believe that their report to the secretary of war will be of an encouraging nature."—Connellsville, Pa., Courier.

The development of oil deposits in northwestern Indiana is progressing rapidly. Nearly every county within a radius of sixty miles of Decatur has one or more wells in course of completion. At Portland, a few days ago, a gas well yielding 75,000 feet was struck, it being the second well for Jay county. The contractors in Decatur are actively at work wiggling the huge drill into the bowels of the earth. In a few days it will be known whether or not gas or oil in paying quantities exists underneath the surface in this section. At Fort Wayne the drillers did not strike limestone until they had reached a depth of twelve hundred feet. As oil and gas are usually found within fifteen hundred feet of the topstratum of limestone, the Fort Wayne company is somewhat discouraged. Limestone was struck here about twenty-eight feet.

The Scranton Truth says: Ex-Judge Stanton has instituted suit against the Fairview Coal Co., of the Scranton, Pa., district, on behalf of the widow and children of Edward Gaughan, who was killed by the recent explosion of gas in a coal colliery. The amount of damage claimed is \$10,000. The suit is based on testimony given by Mine Inspector Blewitt and others before the coroner's jury during the progress of the inquest. The testimony was in effect that a fall which occurred some days before the explosion shut out about 6,000 feet of air, and in consequence gas was begotten in the mine, which the fan failed to remove owing to incapacity. It is quite likely that friends of other victims of the disaster will also bring suit for damages against the company.

When the Delaware & Hudson Canal Co. paid the employees at the Marvine shaft last month, they also distributed between \$5,000 and \$6,000 among the widows and dependents of the men who lost their lives in the recent disaster at that shaft. The sums were distributed according to the circumstances of the beneficiaries, as follows: Three families \$1,000 each, one family \$800, three families \$500 each.—Scranton Truth.

The Grand Union Hotel, New York city, has published a useful little memorandum book which will be mailed to any address on receipt of a 2c stamp.

Address, "Advertising Department," GRAND UNION HOTEL, New York City.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided.

All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

On Air and Water.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following answers to "Q. U. C's" air and pump questions.

1.—Supposing 25,000 cubic feet of air pass in a circular airway 14 feet diameter, what quantity will pass in a round air course 5 ft. diameter, power remaining the same?

Answer.—The area of a 14 ft. diameter airway = 153.9384.

The area of a 5 feet diameter airway = 19.63.

The perimeter of the large airway = 43.9824.

The " " small airway = 14.7.

The $\sqrt{43.9824}$ perimeter large airway = 6.63.

The $\sqrt{15.7}$ perimeter small airway = 3.96.

Now if we use the following rule we will find quantity in the small airway (viz.): Multiply the square root of the perimeter by the area and then in the following proportion:

$$\frac{19.635 \times 3.96 \times 25000}{153.9384 \times 6.63} = 1904.6$$

cubic feet per minute in small airway, and the velocity in the small airway =

$$\frac{Q}{a}$$

that is

$$\frac{1904.6}{19.635} = 97$$

feet perimeter. The velocity in the large airway =

$$\frac{Q}{a}$$

that is

$$\frac{25000}{153.9384} = 162.4$$

feet per minute. And the pressure producing the ventilation in the large airway is found by the following rule:

$$\frac{k s v^2}{a} = p$$

which put in figures =

$$\frac{k s v^2}{a} = \frac{.000000217 \times 43.9824 \times 162.4^2}{153.9384} = .01634 \text{ lbs.}$$

producing the ventilation in large airway. The pressure producing the ventilation in small airway equals

$$\frac{k s v^2}{a} = p,$$

which put in figures =

$$\frac{k s v^2}{a} = \frac{.000000217 \times 15.7 \times 97^2}{19.63} = .016329 \text{ lbs.}$$

producing ventilation in small airway.

Question 2.—What quantity of water is lifted per minute by a pump, the diameter being 14 inches, length of stroke 4 feet, and 5 strokes per minute?

Answer.—The following useful numbers I find in "Fairly Calculator," "Sweeney's Hand Book" and "Wolseworth Formulas" for pumps which might benefit some of your readers:

Let D = diameter of pump in inches.

" S " = stroke of pump in inches.

$$D^2 \times S \times .7854 = \text{cubic inches.}$$

$$D^2 \times S \times .002833 = \text{gallons.}$$

$$D^2 \times S \times .0004545 = \text{cubic feet.}$$

$$D^2 \times S \times .02833 = \text{lbs. of fresh water.}$$

We will solve the above question by these numbers:

$$\frac{D^2 \times S}{14 \times 14 \times 4 \times 12 \times .002833 \times 5}$$

strokes per minute = 133.26 gallons per minute.

Yours Respectfully,

W. SEDDON.

Brownsville, Pa., October 28, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer.

SIR:—The following is submitted in answer to "T. B." of Phillipsburg.

1.—What are regulators for, how constructed, and is it advisable to use many or not?

A regulator in a coal mine is a door or doors, as the case may be, or brattice acting as a door. It works somewhat like the throttle on a steam engine. When you open the throttle valve wide you will have the whole pressure in your boiler going to work your engine, but when you regulate your valve and have it only half open, you will have a less amount of steam going to work the engine. They are constructed by placing a door or brattice across the air course in which an aperture is left, and a slide placed over it to regulate the size, so as to equalize the circulation of air in the various sections in proportion to the size and distance of the sections.

It is not advisable to use any more than there are sections or divisions of air. In placing them in every section, I would be careful to have them placed with my junctions in the course.

2.—How would you ventilate a mine so as to obtain a large amount of air with a low velocity?

I would make extra large airways. The reason being less rubbing surface.

3.—Why is there so much air unnecessarily lost in mines between the inlet and face of the mines generally, and how can it be prevented?

1st.—The principal reason why so much air is unnecessarily lost, is because of so many headings and rooms being left open.

2d.—To prevent it, so soon as the heading and rooms are finished, draw out the pillars and stumps and then build stoppings in the mouth of every finished heading along the main airway and thus confine the air to its necessary distribution.

Yours,

W. B.

Phillipsburg, Centre Co., Pa., Oct. 26, 1886.

Coal Testing.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any of your readers oblige me with a list of a few good works on the chemical analyses of coal—incinerating, &c., &c., and at the same time say where the best apparatus can be obtained for that purpose?

Yours, &c.,

X.

Pottsville, Pa., Oct. 30, '86.

The Best Method.

Editor Mining Herald and Colliery Engineer:

SIR:—Kindly insert the following in your valuable paper:

1.—I am driving a drift in the side of a hill; which is the most improved method of connecting the surface plan with the working of the drift? My object is to leave some coal to support some buildings, and I wish to know the exact place to leave it.

Yours, &c.,

VALENTINE.

Eagle Hill, Oct. 20, '86.

The Siphon Discharge.

Editor Mining Herald and Colliery Engineer:

SIR:—Kindly allow me a little space that I may reply to the query of an "Enquirer." Now with the data given—viz., "300 yards of 3-in. siphon, the apex 18 feet above, and the point of discharge 12 ft. below the intake?" (or as I assume he means, the top of the water) may be readily got. First, then, the short leg = 18 ft., and the long one 30 ft., then the difference = 12 feet, and the theoretical discharge would be such as if the water was flowing through an orifice 3 in. diameter, and with a head = to 12 ft. and the balance per second would be such as a body would acquire by falling 12 ft. freely in space. The velocity² = 27 × 12; ∴ velocity =

$$\sqrt{64 \times 12};$$

velocity =

$$\sqrt{772.8}$$

velocity = 27.4 feet per second, or 328.8 in. per second. The diameter of the pipes being 3 in., the area will = 7 square inches, and

$$328.8 \times 7 = 2,301$$

cubic inches, and

$$\frac{2301}{277.274} \times 8.2 \text{ gallons}$$

per second, or

$$8.3 \times 60 = 498 \text{ gallons}$$

per minute. To get the discharge such as we should expect with the conditions such as has given "Eytelwein" gives the following formula:

$$W = \frac{D^2 \sqrt{S}}{L} \times 4.71.$$

Let D = diameter of pipes in inches. Let H = head of water in feet. Let L = length of pipes in feet. Let W = cubic feet of water per minute.

$$\text{Then } W = \frac{\sqrt{243} \times 12}{900} \times 4.71.$$

$W = 15.36$ cubic feet, or 96 gallons per minute.

Yours, &c.,

H.

Drifton, Pa., Oct. 30, '86.

Omitted the Incline.

Editor Mining Herald and Colliery Engineer:

SIR:—Please say in your next issue that in writing my question of horse power, which appeared in your last week's impression, that I inadvertently omitted giving the length of incline, which is 843 feet.

Yours, &c.,

J. P. L.

Carbondale, Pa., Nov. 3, '86.

Lampblack Explosions.

Some time ago, says the *American Architect*, the manufacturers of lampblack in the Black Forest, like the manufacturers of lampblack everywhere, were troubled by frequent explosions which occasionally proved fatal. No cause for them appeared, and an expert, Herr Engler, was commissioned to make a careful investigation of the matter. At that time it was thought by many that a cloud of any combustible particles suspended in the air could be made to explode. Air charged with flour in flour-mills or with coal-dust in mines often explodes with terrible effect, and there seemed reason to suppose that the fine dust of lampblack, which is usually so disposed to chemical combination as to catch fire immediately on being touched with nitric acid, and often takes fire spontaneously from contact with the air, might behave like flour under similar circumstances. The apparatus employed in the investigation was very simple, consisting mainly of a long box furnished with a gas jet at one end and a tunnel at the other, with a wheel to distribute the dust into a cloud, filling the box. Many trials were made with the lampblack, both crude and refined, so as to take away from the dust its tendency to adhere to flakes, but in no case was any explosion obtained, nor could the dust be ever burned, except so far as the particles came actually into the influence of the flame. With flour, on the other hand, a tolerably lively deflagration was always produced, and with naphthalene or rosin-dust a sure explosion followed. Powdered sulphur burned quickly throughout the box, but neither charcoal-dust nor lampblack suffered any change. Reflecting that the air in lampblack furnaces is warm, Herr Engler repeated his experiments, both with this and with charcoal-dust, mingling them with heated air to a temperature of 500 deg. F., but the result was precisely the same. The dust of soft coal is known to be very explosive, and Herr Engler concluded, as others have done, that unless the dust in the air is of such a character as to give, by heating, combustible gases, it will not form with air an explosive mixture. Soft coal, when heated, gives off hydrocarbon gases, and flour produces similar ones, joined to others, and both these, when mixed in dust with air, explode, while charcoal and soot, which produce no gas by heating, will not propagate flame when in that condition. Another series of experiments was then made to see whether if inflammable gases were supplied to the air from some other source the charcoal and lampblack dust would explode. The apparatus was connected with the city-service gas-pipes, and different proportions of ordinary carbureted hydrogen were admitted to mix with the air in the box. If 8 per cent or more of gas were allowed previously to mix with the air, and dust of charcoal or lampblack were then scattered through it, an explosion took place on applying a flame. If from 3 to 8 per cent of gas were present there was no explosion, but the box was filled with flame. If only 2.4 per cent of gas were present there was no burning of the dust. As lampblack furnaces very often contain hydrocarbon vapors, from the imperfect burning of the oil or other material used to make the lampblack, the explosion of the dust in them, in presence of this gas, was easily explained, and the method of avoiding such explosions by improving the combustion indicated.

GENERAL AFFAIRS.

Powdered camphor, added to oil or turpentine varnish, will allow it to spread more easily.

It requires the annual slaughter of 100,000 elephants to keep the world supplied with ivory. England alone uses up the product of 30,000 elephants, or 1,200,000 pounds.

Anthracite coal dust is to be made into coal bricks for fuel to be used in locomotives, glass furnaces, steamers and for domestic purposes. A company has been formed with a capital of \$75,000, and it expects to go to work on a large scale right away.

A large ledge of coal has been discovered on the land of E. P. Fellows, on Stevens creek, Santa Clara county, California, averaging six feet wide. Croppings, it is said, have been traced for more than a mile. The surface specimens are of an inferior quality.

The Philadelphia *Record* says:—President Corbin, of the Reading railroad company, is at present engaged in the consideration of plans for the leasing of the coal properties of the company on royalties after reorganization has been effected. Such a scheme strongly commends itself to the management from the fact that this disposition of the collieries will save enormous expenditure entailed in maintaining the organization of the coal and iron company.

"THE COAL CONSPIRACY."**How it is Regarded by Papers in the New England Region.**

A conspiracy that ought to be criminal, which affects every home in a large part of our land, is that of the Pennsylvania coal monopolists to raise the price of coal and restrict the output. It is not done because prices are unremunerative, but to put more money in the pockets of the conspirators. The poor miners who are working in poverty for a bare subsistence of the lowest order do not receive any benefit from this, but on the contrary, have the days of their labor diminished. The enormity of the offense of this coal pool towers above the conspiracy of the criminal boycott, and yet the public are very much exercised about this and hardly take note of that. It would be but a natural social revenge if a storm should arise that should sweep these coal conspirators into perdition.

It is just now the fashion for newspapers as well as individuals to frantically howl and rave over anything that seems to bear the taint of "monopoly," but the above from the *Manufacturer and Industrial Gazette*, a journal published in Holyoke, Mass., and claiming to be "devoted to manufacturing interests," is the worst example of journalistic idiocy and blatherskitism that we have yet seen. Any newspaper that attempts to defend such outrageous attacks upon the industries that are the life of the country, or that even dares to intimate the existence of another side to the story which the public ought to know, does so at the risk of being soundly berated and abused by its contemporaries, and of being looked upon as a "tool of the monopolists" by their readers. Yet it is fortunate for the country that there are a few journals scattered about which prefer to give expression to truths and honest sentiments rather than fall in with the popular clamor and make use of the arts and utterances of the demagogue.

The coal companies operating in the Pennsylvania anthracite regions have \$500,000,000 invested in properties that for some years past have paid them less than nothing and today pay an interest on the capital of not more than 2 per cent. That they are paying 2 per cent. or thereabouts is due solely to this "combination" of interests which is not a combination at all. In past years these several companies were trying to cut each other's throats—that is, each was striving to outbid and undersell the others. This competitive system reduced the miners' wages and came very near ruining all the operators. Was the public benefited by it? We shall see. The necessities of the situation finally compelled the companies to meet amicably and pool their interests to a certain extent. They estimated the amount of coal that the market would probably require in a given season, and then allotted to each company the proportional share it should mine and transport. This is the whole extent of the coal combination or conspiracy.

What has been the result? Has it lowered the miners' wages? Has it raised the price of coal, or reduced the supply in the markets? The statistics, which are easily obtainable by anyone, will answer. Coal is selling this year at 30 to 40 cents below the prices of '84. Last year the total output was 31,000,000 tons; this year it was decided to mine 33,500,000 tons, and it is already found that the amount required was over-estimated—that the market cannot dispose of so much as that. The miners' wages are higher than they have been for several years, and the recent advance in the selling price of 25 cents a ton will enable the companies to give the 10 per cent. increase asked for; several companies have already advanced wages 10 per cent. over summer prices, and we doubt not that the others will do so. The companies are not, however, bound to demand a uniform price for coal; each has full liberty to get the highest price it can, precisely as does any merchant who has an article to sell. It is strange that higher prices should be asked and obtained for coal at this time at any other season of the year? Why should ice cost more in the summer months than during the winter season? Why are eggs and poultry higher in the holiday season than at any other? Why are fireworks more expensive just before the 4th of July than at any other season? Anyone who can answer these questions can tell why coal should be higher in price during the approach of winter than at other times during the year.

The socialistic and labor questions that threaten this country at times with revolution and anarchy are matters that can be peaceably and satisfactorily settled only by education, by a full understanding of all the problems and interests involved. But more than any education of the wage-earning classes or of the masses is needed an education of the newspaper fraternity, so that the journals which claim to represent or to lead public opinion shall present matters in their true light.—*Bangor (Me.) Industrial Journal*.

The Calumet and Hecla Mining company in its extensive copper mines in the Lake Superior region, is introducing compressed air as a motive power for propelling tram cars. Experiments are now in progress with several small locomotives, which have been built for this purpose, and which, if perfected, will do away almost entirely with tramping by man power.

THE *Iron Review* and the *Railway Magazine*, Buffalo, (N. Y.) journals, have been consolidated and the result is a neat, compact and interesting monthly publication.

Natural Gas.

Since the introduction and use of natural gas in so many of the extensive mills, factories, etc., at Pittsburg, remarks a contemporary, a very great relief has been met with by the people of that city in the absence of the dense smoke which, under the old coal-burning regime, permeated everywhere. The use of natural gas, and the aid of smoke consumers in some of the factories where coal is still employed, have given to the once "Smoky City" a remarkably clear atmosphere. Right here some detached facts on the subject of natural gas may not be without interest. Gas wells are five and five-eighths inches inside diameter, and average 1,600 feet in depth. It cost \$6,000 to drill and "case" a well. The pressure at the mouth of the well varies from 40 to 1235 pounds to the square inch, and with this range furnishes sufficient carbon to substitute 50 to 1000 tons of coal daily. Notwithstanding the great friction on the pipe, gas travels at the rate of six and two-thirds miles per minute. It is the only self-running and self-propelling fuel known. The "life" or duration of wells is not yet fully demonstrated. We opened twenty-four years ago are yet flowing with undiminished pressure, and those which are apparently exhausted renew their full flow after being cleaned out. The combustion of natural gas is so perfect that there is practically no flame. It burns with a pure rose color and makes a tremendous heat. It is exceedingly penetrating, and this, combined with its entire absence of odor, renders it a dangerous agent. It is proposed to odorize it by passing it over a tank containing the refuse from coal tar and ammonia. It is so subtle that it will pass through paper, or gold or silver leaf. It is destructive to animal life when inhaled for a short time. The theory generally accepted, and which goes as to the origin of the gas is that the water from the earth's surface, penetrating to the inner fires, is decomposed into hydrogen, and this, gathering into large bodies, is freed by the drill and rushes to the surface. According to this theory the supply can never be wholly exhausted as long as the processes of nature continue as at present.

PROJECTS IN COAL.

At Adrian, Pa., 600 coke ovens are being built.

The Citizens' mining company of Columbus, Kansas, has received its charter; capital \$7,000.

The Reading company is preparing the Brady colliery near Tamaqua, Pa., for a resumption of work.

The Lehigh coal and navigation company is developing a colliery at Coaldale, Pa., which, it is stated, will prove to be the leading mine in the anthracite region.

J. H. Beeler has leased his coal shaft at Lebo, Kansas, to a Mr. Kellar, of Osage City, who will commence work at once, paying one cent per bushel royalty.

A proposition to appropriate the sum of \$12,000 for the purpose of more thoroughly testing the coal seams underlying Cloud county, Kansas, is before the county commissioners.

The Lebo coal and mining company, of Kansas, have concluded to sell or lease their coal mine, with all its fixtures to good responsible parties on such terms as will give the purchaser at least \$1,000 worth of work in advance.

The great coal firm of Perwind, White & Co. have purchased an immense tract of coal land near Atlanta, in Clearfield county, Pa., and have a corps of prospectors locating the seams and making drifts. The company expects to be shipping by June next.

The Buffalo, Rochester and Pittsburg, recently reorganized, in the extension of its coal business lately purchased 1,100 acres near Punxatowney, Pa., making about 3,300 acres thus far this year. Shipments of coal are about to begin from Walston, where a new opening has been made with a capacity of 2,000 a day.

A Canadian correspondent of *Bradstreet's* writes that the Northern & Northwestern railway of Ontario is the most direct avenue for bringing forward the rich mineral deposits of northwestern Ontario. Recently a gigantic find of copper ore was made in the Lake Nipissing region, a short distance from the junction of the Northern & Northwestern railway system with the Canadian Pacific. It has been taken hold of by a syndicate mainly composed of Ohio men. As no coal has as yet been discovered in Ontario and the nearest Canadian coal fields are in western Manitoba, a long distance off, coal from the United States must be taken to the ore or the ore must be conveyed to the coal. There is some talk of erecting smelting works at a convenient halfway point, say at Hamilton, where coal could easily be carried by water, but meanwhile the ore will be taken to the States.

A patent was issued October 26, to a Pittsburg inventor for a new system of distributing electricity to be used in lighting and for other purposes—a system which, it is said, will greatly cheapen the electric light and render it a more dangerous rival of illuminating gas than it has ever become. The new invention will, it is alleged, effect a saving of about 95 per cent. in the distributing main wires. In tests of the invention a single main circuit of wire less than one-quarter of an inch in diameter carried the current for 850 sixteen-candle power incandescence.

THE LOCOMOTIVE.**How Greater Steam May be Secured at a Less Cost of Coal Consumption.**

Writing under the above head the *National Car and Locomotive Builder*, says among other things: "We are far from wishing to depreciate efforts to reduce the quantity of coal used to generate steam in locomotive boilers, but at the same time we would like to point out that the possible saving is much more limited on well managed roads than many people believe it to be. A well-designed stationary or marine boiler with natural draft and well fired will utilize about 80 per cent of the heat in the coal for steam-making, and about 20 per cent will be lost by the hot gases passing through the chimney. It will never be possible to do much better than this, for the heat in the waste gases must necessarily be higher than the temperature of the boiler. These results are obtained under conditions that never can be equalled with a locomotive when a smaller boiler must be forced to evaporate a large quantity of water to the foot of heating surface. There are locomotives running on many railways, pulling heavy or fast trains, that utilize about 60 per cent. of the heat developed by the coal. Engines of this degree of efficiency are rather exceptions, as the accounting of 50 per cent. of the heat is about the ordinary average; but the locomotives making the best use of their coal have no features about them that all engines on American railroads might not easily possess. Plenty of grate area and liberal heating surface in proportion to the cylinder capacity is the first requisite, which is supplemented by careful firing. With the high-steam pressures becoming established, and the rapid flow of the gases naturally generated, steam will pass through the cylinders of a locomotive doing the work of moving our heavy trains, it will never be possible to reduce the smoke-box temperature much below 600° F. That being the case the utilizing of 60 per cent. of the fuel heat is getting close to the possible limit.

Good firing is an essential that must never be lost sight of where efforts are made to make a locomotive boiler do its work to the best advantage. When this is attended to the engine is suffering from some structural defect if the heat represented by the steam does not come close to 60 per cent. of the potential energy of the fuel. The most common mistake has been that of making the boiler too small for the cylinders, but it may occasionally be found that the boiler is large enough, yet badly proportioned in other ways. The fallacy which found numerous adherents for a time, that the tube service was of little value in steam-making, has been a costly piece of engineering heterodoxy to many railroad companies. The immense fire-boxes that came into use as a substitute for tube heating surface have not contributed to the economy of fuel in ordinary service. Where a locomotive has to work nearly at its maximum power all the time, an immense grate area common to the large fire-boxes will conduce to economy, since a moderate quantity of coal will be consumed per foot of grate, but when an engine of this kind is required to work light, the consumption of coal becomes so low for the area the fire is spread over that it is impossible to prevent waste by the cool air reducing portions of the fire-box below the igniting temperature.

With a very large grate the tendency is to supply more air than the fire requires. Every cubic foot of air supplied beyond what is necessary for chemical combination is so much superfluous gas that has to be heated and passed through the tubes. As the heat produced by a pound of coal is always the same, the temperature of the fire varies inversely with the air heated by the combustion. This being the case, it is not surprising that much disappointment has resulted from the promiscuous increase of grate area in locomotives that work light a great part of the time. The kind of coal to be used and the nature of the service the engine will be required to do ought to influence directly the proportions of grate and heating surface to cylinder capacity. When these questions receive intelligent consideration our master mechanics may safely depend on getting an economical locomotive boiler.

The report of the geological survey of the state of Pennsylvania, in reference to the re-survey of the Pittsburg coal regions, has the following: "The Pittsburg region has an outspread of the Pittsburg coal bed, fifty miles long by fifty miles wide, within the limits of the state. In the northwestern part of this area, the bed is two or three feet thick, increasing in thickness eastward and southward to six feet of good coal at Pittsburg, ten feet up the Monongahela and twelve feet up the Youghiogheny. What the thickness of the bed may be underneath the uplands of Washington and Greene counties, we now know by the gas wells. It maintains its thickness in that direction. An average of eight feet for the whole region looks like a fair one. This gives 8,000,000 tons to the square mile, and there are 2,500 square miles. Allowing one-half of the area to be interval separating out-crops, we have then 10,000,000 tons remaining in this one coal bed. Allowing fifty per cent. for pillars, bad mining and waste of all kinds, we may set down its coal available for market in the future at 5,000,000,000 tons.

IOWA COAL MINES.

The Mineral Wealth on Which Lehigh County's Future Prosperity is Based.

The Lehigh coal has been thoroughly tested in the market with the best product anywhere in Iowa or Illinois, and the universal verdict is "none superior in quality." In fact during the past winter as our dealers pushed their trade into new localities, they were able to drive from the field the product of mines having a "crack" reputation, on the quality of coal. When the Lehigh coal beds were comparatively unexplored the state geologist, in his report of 1870 speaking of them said: This promises to be one of the most important portions of our coal-fields, notwithstanding its close proximity to the border." At that time but two beds had been found and partially tested. At the present five distinct workable seams have been identified within the town and immediate vicinity. The second and third seams are perhaps the most valuable, mainly on account of being worked with greater facility, though paying works are in operation in each of the others. We are only about twenty miles from the northern borders of the lower coal measures, yet the beds are practically inexhaustible, easily worked, and by the completion of the Mason City and Fort Dodge and the Webster City and Southwestern railways we shall have an overwhelming advantage of all other points in distance and facility for reaching northern and western markets. The seams are from 2 ft. 8 in. to 4 ft. in thickness, the roofing is good and the deep ravines afford in most instances an opportunity for drift openings, there being but one slope and two shafts among the fifteen mines now in operation. The drift opening is by far the least expensive and avoids a part of the risk in the perilous vocation of mining. The coal beds are generally from 100 to 250 feet below the general surface of the country. This is an evidence that they are rich and extensive and no doubt to prove mere pockets as has been the case further north where the average depth has been not more than 50 or 100 feet. But on this point we are not left to inference however conclusive. Entries have been driven to the distance of 1000 yds. with indications of the coal thinning out, and during the coming winter one of the longwall mines will work a face near 1 mile in length.

The first coal mine in Lehigh was opened by John Sturdevant in the fall of 1864 on what is now known as the Treyethen property. The first winter he took out twenty-five tons. His kit of tools consisted of three picks, three wedges, an old ax and a shovel, and he carried out the coal in a bushel basket. A second mine was opened shortly after by O. Tyson, on the west side of the river, and the third by John Sturdevant, on the east side. The trade at that time was confined to local demand. After the completion of the Illinois Central, R. R., a considerable amount was drawn to Duncombe ten miles, in wagons, and shipped from there to Parkersburg, Ackley and Webster City.

The building of the C. C. R. R. to a connection with the Illinois Central at Judd in 1876 gave a great impetus to the coal business in Lehigh. New mines were opened, improved methods introduced, the market widened by the persevering effort of active and efficient salesmen, and all the advantages imparted to the business which skill and enterprise could invent. Yet the industry has labored all along to the present time, under the disadvantage, lack of direct communication and easy transport to the best markets. But that cloud is now largely dispelled by the advent of two new railroads. Our dealers may now compete on equal footing for trade heretofore entirely beyond their reach and works which have been compelled to remain closed during half the year or more, greatly to the detriment of business in general and oftentimes almost to the suffering of miners, may now run without intermission three hundred days in the year.

Such was the beginning and in early years the slow and painful growth of an industry which now represents a value of over \$500,000, will employ in a short time 600 men, put out a thousand tons of coal per day and bring into Lehigh for distribution among its citizens not less than \$1,500 for every day's work. Nor will the benefit be to Lehigh alone. The surrounding country will share all the profits to the full. The wealth that nature stowed up in these hills in that far off little age of the cycle of ages enriches not the state of Iowa alone but all the northwest.

Silas Corey opened his first mine in Lehigh in 1870 and another in 1875; which has been worked under the management of his son, Silas W. Corey. Both of these mines have been in active operation during the winter season and to some extent through the summer and fall ever since the date of their opening. Mr. Corey owns 145 acres of excellent coal land. As yet he has worked only the second, or what is known as the Tyson seam, though two other workable seams are known to exist. He has recently opened a third mine south of Crooked Creek. This will be operated longwall and the face will be near one-half mile long. There will be employed in the three mines the coming winter upwards of 150 men and they will put out in the neighborhood of 300 tons of coal per day.

The Black Diamond mine, owned and operated by W. C. Beem, was opened in '73. At the present

there are two sets of works one on each side of Crooked Creek. During the coming season he expects to employ 100 men and put out at least six car loads of coal per day. The coal is from 3 ft. 10 in. to 4 feet in thickness and we challenge the state to show a better quality. Mr. Beem owns 320 acres of proved coal land; 26 feet below his present works is a workable bed of coal 2½ to 3 feet in thickness and 56 feet reaches another 6 feet in thickness. In view of these facts, if there was no other mine here but the Black Diamond, it would take several years to exhaust the supply of coal.

The C. C. R. R. & coal company own 463 acres of first class coal land in and adjacent to Lehigh. In '76 they constructed and equipped the C. C. railroad from this point to Judd on the Illinois Central with the main purpose of developing the coal interests here. Since that time they have shipped of their own coal upwards of 150,000 tons. They have now built and equipped the Webster City & South Western railroad, having its terminus at the present in this place. They will employ in their mines the coming fall and winter 175 men and put out from 300 to 400 tons of coal per day. Besides the drift leased to Higby brothers, they have three mines open for shipping and one for local trade. They are working both the second and third beds of coal. The former is from 2 ft. 8 in. to 3 ft. 10 in. in thickness the latter is from 2 ft. 8 in. to 2 ft. thick.

The firm of Parks & Cox operate a mine on the north side of Crooked Creek and west of Silas W. Corey. The coal is three feet and eight inches in thickness and of first rate quality. During last winter they shipped about 4,000 tons, a large part of it from 100 to 150 miles north and west. They are arranging to open another mine north of town in a short time.

J. L. Harper owns and operates a bank on the north part of town. He has both a shaft and a drift opening to his mine. This the upper seam, about three feet in thickness, and it is a great favorite with the local trade, which speaks highly for its quality, as the coal is a little competition among the mines for this trade. The Tyson seam, four feet in thickness lies below its present works.

Henderson & Williams' mine is situated east of J. L. Harper's and is similar in quality and thickness being of the upper seam. They are able at least to put out 30 tons per day, working from ten to fifteen men. Though they have shipped the larger part of their output hitherto, they expect in the future to make arrangements to meet the demands of the local trade at all times, and propose in a short time to sink a shaft to a lower seam and run two sets of works.

Higby Bros. operate a mine on the west side for the C. C. R. R. and coal company, and also one of their own with a force of 20 men. They have an extensive local trade. The coal is from two feet eight inches to three feet two inches in thickness and belongs to the second seam.

The Mason City & Fort Dodge railroad company, now completing its line to this place, owns 2800 acres of first-class coal land. They have as yet opened no mines but will doubtless soon begin operations.

North, south, east and west of the city are rich coal beds thoroughly prospected which we have not mentioned as the plan of this article only embraced a notice of the principal mines now in operation. Several other mines have been in operation and are closed at present on account of repairs needed in entries and roadways. Whether they will be put in condition to work this coming winter we do not know. One of these is the property of Wm. Doud, who owns over 200 acres of valuable coal and upon which there is at least three workable beds of coal. Some of our experienced operators think that the force our mines are capable of employing at present will not be sufficient to supply the increased demand resulting from the exhaustion of other coal works heretofore competing with us.—*Lehigh Echo*.

USING EXHAUST STEAM.

How It Can Be Utilized and What Is Gained By It—A Practical Conversation.

Asked a saw-mill owner of a well-known mechanical engineer. "Why is it that so much talk and fuss is made over using exhaust steam, and yet we find but very few engines which are not puffing a cloud of vapor into the air all the time they are running?"

"I will tell you my views, Mr. Owner. Many men who own and run steam engines do not understand fully how the heat given up by coal is used, and also, how more than three-fourths of it is wasted beyond recovery."

"Exhaust steam should always be used to warm the feed-water, but only a small part of it can be utilized in this manner. The feed-water should be delivered into the boiler as hot as possible, and that is 212 degrees, or less."

"With the exhaust steam passing at pressure of the atmosphere through a good heater, it is impossible to heat the feed-water hotter than 212 degrees, but with back pressure applied to the exhaust, the water can be heated considerably hotter."

"Do you mean to say," asked Owner, "that the feed-water can always be heated at 212 degrees?"

"No, Mr. Owner; by all means, no. If you get water into your boiler at 200 degrees, you may get a good result from your heater, but still better results ought to be obtained."

"It requires more latent heat to warm water to the boiling point when the water is under pressure,

as is shown by the boiling point of water at sea level, and in mountainous regions, so it is always better to force water from pumps to boil through the heater, than it is to draw water through the heater by action. In the first case, the water is under boiler pressure, and will receive more degrees of latent heat, also being colder, the water will not flash into steam when in the pump barrel, to the despair of that useful machine."

"But, Mr. Engineer, how much of the exhaust steam will be used up, or condensed in heating the feed-water? In other words, how much of the exhaust steam is it possible to utilize in this manner?"

"Well put, Mr. Owner, now let's figure a little. Heating water from 40 to 212 degrees requires about 2-13 the amount of coal necessary to convert water into steam at any reasonable pressure, and the above fraction is equal to about fifteen per cent. of the coal heap, therefore it represents the greatest possible saving, but is not often accomplished practically. We can only use about 3-11 of the exhaust steam in heating the feed-water, and allowing 1-11 for loss by radiation, there are 8-11, or nearly ¾ of this steam left to be wasted in the atmosphere, or to be used by other purposes."

"Why is it, then, Mr. Engineer," said Owner, "that so much fuss is made about using exhaust for heating the mill or shop? You have just demonstrated that three-fourths the entire heat imparted by coal to the steam is carried away in the exhaust from an engine, and now tell me why it cannot be successfully utilized."

"It can be utilized, and a misunderstanding of the real behavior of an engine under slight back pressure is the direct cause of most trouble from this source."

"Here is an engine running with fifty pounds mean pressure. I put on back pressure of two pounds therefore the loss is just four per cent.; but, as the energy of an engine—as above—deduced accounts for one-quarter the practical value of one coal heap, we, therefore, have sacrificed just four per cent. of one quarter, which is equal to just one per cent. of the coal value, and as the exhaust steam contains seventy-five per cent. of the coal value, there is a pretty large balance in favor of using the exhaust steam for heating buildings, or drying lumber."

"Mr. Owner, you can study exhaust steam using with great benefit to your mill men, and to your own pockets. If we take 1000 feet of two-inch pipe, and connect it in four or five branches to the exhaust from one engine; if we close tight the ends of these pipes, with only trap outlets at the ends of each branch, and keep the temperature up to 212 degrees, it will not require much time to fill the pipes with steam, causing back pressure enough to stop the engine. Now, if we immerse this 1000 feet of pipe in cold water, our engine will run all day without showing evidence of a particle of back pressure. In fact, it is extremely likely that a partial vacuum will be formed in the immersed pipes, which will be a decided help to our engine. Supposing, now, we put our pipes around the mill, and exhaust into them, for a time, the steam all condenses, and the partial vacuum is present. After the air around the pipes gets warmed, the steam does not give up its heat so readily, and back pressure begins to show itself, but if our circulation pipes are large and long enough, it is pretty certain that they would take care of all the exhaust steam passed into them, and the buildings would be warmed without extra cost of coal. When starting a circulation of this kind, it would be necessary to remove all the contained air, either by blowing live steam into the circulation, or by running the engine awhile with the extreme ends of circulating system open to the atmosphere. In this case, back pressure would be present to allow the exhaust steam condensing room, then the pipes could be closed, and a perfect condensing system would be the result."

"Why is it, Mr. Engineer, that the present system of exhaust heating do not work satisfactorily?"

"Because, sir, the sectional area of the pipes is not large enough. Steam which will pass through a six inch pipe, without back pressure, cannot be made to pass into two or three one-inch pipes without trouble. The area of all your branches must equal area of exhaust pipe, and the branches must be long enough to condense all the steam entering them."

"It looks reasonable, don't it, Mr. Owner?"

"Yes, Mr. Engineer, it certainly does,"—*James F. Hobert, in Journal of Progress.*

Professor Fischer, of Munich, after an extended research on the nature and properties of quinine, has discovered that a substance may be extracted from coal-tar that exercises on the human organism an action identical with that of quinine. The substance appears as a white crystalline powder. Administered in cases of fever, it has the effect of rapidly raising the temperature, and its efficacy in this respect is stated to be so remarkable as to permit the use of ice to be dispensed with; in the stomach, the wonderful powder assimilates with even greater facility than does quinine.

The Standard coal mine, at Mount Pleasant, Pa., caught fire from furnace sparks on the 30th. In less than an hour the tippie shaft and engine house were destroyed and the mines then ignited. More than 400 men are thrown out of work. A column of flame and smoke leaped from the mouth of the shaft to a height of 100 feet. The mine was flooded at once.

TRADE REVIEW.

THE COAL TRADE.

The two holidays in last week curtailed the output of coal 77,650 tons as compared with the corresponding week of last year, but the activity manifested this week with the favorable weather ruling will doubtless make up much of the deficiency. The demand for coal is reported brisk in all sizes, the cold snap of the past few days having stiffened up the market for the smaller grades, in which alone had there been any falling off. A Philadelphia report stated early in the week that the Reading company was unable to fill its old orders, and was refusing new ones because of a lack of sufficient coal to supply them. Last week the Reading company was reported to be endeavoring to purchase in the New York market a large daily supply of stove coal to fill pressing orders. Advances from the same city stated that orders for stove and chestnut were piled upon the books of other producers to quite an extent. Despite this favorable condition of demand there has not yet been shown any serious intention to advance prices this month, although to inexperienced eyes it seems wonderful that so favorable an opportunity is permitted to go unimproved. Some of the producers, speaking individually, are in favor of an advance on certain sizes, holding that as settled cold weather will soon be upon us, the effect would be only to stimulate the demand for those sizes. There can be no doubt that in the short time which remains of the shipping season, a large quantity of coal has to be handled, and it will make little difference to the purchaser whether he pays 15 or 20 cents per ton more or less; the coal he must have. The exchanges, though, are disposed to move with extreme caution in this particular, but at the same time it is likely that they will see that anthracite brings its full market value.

The late snowfall and its thawing was a godsend to the coal operators of the Pittsburgh region, the river rising sufficiently to permit a portion of the immense quantity of coal loaded to be sent to points down the Ohio river. The cold weather had caused an increased demand for coal at Cincinnati, reducing the supply on hand and making the shipments come in opportunely.

There has been a great deal of talk lately about impending strikes in the Schuylkill, Shamokin and Lehigh region, much of which has been mere sensationalism. In the Schuylkill field there is no real probability of any difficulty, operators and employees being on most amicable terms. In the Lehigh section all matters were satisfactorily adjusted a couple of weeks ago and there is no likelihood of any jar there this year at least. There is unquestionably serious discontent among the Shamokin miners, but no general strike is impending. At Excelsior the miners are on strike for the ten per cent. advance demanded, but they are battling alone. Baumgardner & Co., of the Enterprise colliery, conceded the advance. The employees of the Union and Mineral mining companies have several times voted to go on strike but on Monday at a final consultation and comparison of their condition for a prolonged struggle they found themselves unable to stand the strain and so abandoned any thought of striking for the present. Superintendent Stearns says that the prices of coal at present will not warrant the ten per cent. advance asked. The difference existing between the employers and employees at the Logan colliery, near Centralia, has been, we are informed, satisfactorily adjusted.

The now approaching opening of the Pennsylvania Schuylkill Valley railroad into the Schuylkill coal field is the greatest topic of public interest, because it has been maintained by so many that a coal tonnage war between it and the Reading road would inevitably follow. There seems now less likelihood than ever of any such conflict. President Corbin has expressed a positive desire for harmonious relations, and in keeping with that feeling comes a report that an understanding has been arrived at by which an aggregate of 150,000 tons of coal annually from the William Penn and Thomas collieries in the Shenandoah valley, and one other colliery in the Mahanoy valley, will be transferred from the Reading lines to the Pennsylvania railroad, in whose interest the breakers and fixtures of the collieries have been purchased.

In the bituminous coal trade there is nothing new so far as regards the present, the demand continuing good and prices being maintained in the usual way. There is a positive determination, though,

to effect some arrangement by which the January and February deliveries of coal may realize more money to the operating interests. The regulating of the entire production is the ultimate aim of this movement, but for the present the "half-loaf" policy will be pursued.

The total amount of anthracite coal sent to market for the week ending Oct. 30, as reported by the several carrying companies, was 816,674 tons, compared with 894,324 tons in the corresponding week last year, a decrease of 77,650 tons. The total amount of anthracite mined thus far this year is 26,395,359 tons, compared with 25,625,279 tons for the same period last year, an increase of 770,080 tons. The following statement gives the gross tonnage of each of the leading coal carrying companies for the week ending Oct. 30, and for the year to same date, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R. R.....	328,637	11,794,738	1,247,212	1,547,526
High Valley.....	148,717	5,890,914	5,585,517	311,397
D. L. and Western.....	140,717	4,194,771	4,050,150	144,621
Shamokin.....	21,184	698,102	839,302	141,200
Und. R. R. N. J.....	51,988	1,401,398	1,441,212	39,814
Penna. Coal.....	41,192	1,236,826	1,147,766	89,060
Del and Hudson.....	119,761	3,397,655	3,160,922	237,633
Pa. and N. Y.....	50,076	1,686,792	1,478,110	208,682
Clearfield Pa.....	57,571	1,806,421	2,276,705	154,684
Hun and B. Top.....	14,985	549,353	517,078	32,275
Nor. and Wtn.....	17,736	706,125	482,519	223,606

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Oct. 30 was 352,196 tons, of which 262,039 tons were coal and 90,156 tons coke. Of this weekly tonnage 273,549 tons originated on the main line of the Pennsylvania railroad while the remainder originated on its branch lines. The total tonnage for the year thus far has been 12,409,938 tons, of which 9,549,463 tons were coal and 2,860,470 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending November 6, was 276,000 tons, of which 27,000 tons were sent to and 28,500 tons shipped from Port Richmond, and 29,000 tons were sent to and 34,000 tons shipped from Elizabethport. Vessels are reported in fair supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 90c. and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending Oct. 30 were 70,761 tons, and for the year to that date 2,038,028 tons, a decrease of 267,129 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—week, 51,994 tons; year, 1,591,301 tons; decrease, 63,640 tons. To Pennsylvania railroad—week, 6,776 tons; year, 211,728 tons; decrease, 133,127 tons. To the Chesapeake and Ohio canal—Week, 11,990 tons; year, 234,999 tons; decrease, 70,362 tons.

Chicago.

From the Industrial World.

Anthracite, though moving a little more freely from the east, is greatly in demand, as is shown by the fact that country merchants are willing to give 25 to 45 cents over card rates in order to get a supply. The local trade is in very fair shape, with an advance of 25 cents in the retail prices, making those figures \$6.75 and \$7 per ton. The wholesale card rates remain as before quoted.

In bituminous coal there has been a slight improvement in the call and in prices, the advance being from 15 to 25 cents.

Cannel coal also shows a gain in value, and orders are more numerous.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.

	Per gross ton by cartload, 2240 lbs.
Grate.....	\$ 6 15
Egg.....	6 15
Stove.....	6 15
Nut.....	6 15
Lehigh Lump.....	8 40
No. 4.....	6 75
	Per net ton by cartload.
Grate.....	\$5 50
Egg.....	5 50
Stove.....	5 75
No. 4.....	6 00
Nut.....	5 75
Lehigh Lump.....	7 50

BITUMINOUS.

Erie & Briarhill.....	\$4 50
Pittsburg.....	3 50
Indiana Block.....	2 25
" Slack.....	1 25@1 35
" Nut.....	1 55@1 80
Baltimore & Ohio.....	3 00
Hocking Valley.....	3 00
Youghiogheny.....	3 50

Wilmington.....	2 10
Blossburg.....	3 50
Cumberland Smithing.....	3 70
Southern Smithing.....	3 80
Grape Creek.....	2 00
Fountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Minonk.....	2 00
Morris.....	2 00

CANNEAL.

Kanawha.....	5 00
Buckeye.....	4 35

COKE.

Connellsville Coke.....	4 75@5 00
Crushed Coke.....	4 75@5 00
Charcoal, carload per bu.....	8 50@9 50

Pittsburg.

From the American Manufacturer.

Every feature of the coal trade is about as it was reported last week. There is no water on which to send out coal, and none on which to return empty vessels. In consequence, there is a scarcity of craft at the mine, which forces a restriction of mining. Prices below are firm, but unchanged. At the railway mines the situation is fair, but it undoubtedly has been better.

Prices remain as follows:

PRICES AT PITTSBURGH.

River, wholesale, on board.....	4 @ 5 cts. per bushel.
Railroad.....	4 1/2 @ 5 cts. per bushel

AT CINCINNATI.

River, wholesale, on board.....	7 @ 8 cts. per bushel.
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AT LOUISVILLE.

River, wholesale, board.....	7 @ 8 per bushel.
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AT NEW ORLEANS.

River, wholesale, on board.....	26@28 cts. per bu.
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Bushels are rated among dealers here at 76 lb.—26 1/2 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4/7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

The demand for coke is still very heavy. The only excuse of complaint is the continued scarcity of cars. A number of blast furnaces are out of blast that would blow in if coke could be had; and it could be had if there was greater transportation capacity: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Nov. 6, 1886:

	Week.	Year.
	Tons.	Tons.
Shipped North.....	75,007'02	2,016,094'10
Shipped South.....	44,898'09	2,298,582'09
Total.....	119,905'11	4,314,676'19
For corresponding time last year.		
Shipped North.....	62,715'07	2,009,611'02
Shipped South.....	90,149'06	2,173,104'10
Total.....	152,864'13	4,183,015'12
Increase.....		131,661'07
Decrease.....	12,959'02	

Pennsylvania Coal Company Shipments.

Following is the report of shipment of Pittston coal for the week ending Nov. 6, 1886:

Shipped East to tide.....	25,436'07
" Local points on E. M. & E.....	61'209
" West via L. S. & Erie.....	8,907'02
Total.....	38,355'18

Freight Rates.

The following are the current rates of freight on Anthracite coal from Port Richmond, as officially reported Nov. 3, 1886.

To Bangor.....	To Fall River.....
" Gardiner.....	" Providence.....
" Portland.....	" New York.....
" Saco.....	" Baltimore.....
" Portsmouth.....	" Washington.....
" Newburyport.....	" Norfolk.....
" Lynn.....	" Richmond.....
" Boston.....	" Charleston.....
" New Bedford.....	" Savannah.....

There is more in a heap of coal than a thoughtless person may discover. Besides gas, a ton of gas coal will yield 1,500 pounds of coke, 20 gallons of ammonia water, and 140 pounds of coal tar. Destructive distillation of the coal tar gives 69 1/2 pounds of pitch, 17 pounds of creosote, 14 pounds of heavy oil, 9 1/2 pounds of naphtha yellow, 63 pounds of naphthaline, 475 pounds of naphthal, 2 1/2 pounds of alizarin, 2 1/4 pounds of solvent naphtha, 1 1/2 pounds of phenol, 1 1/2 pounds of aurine, 1 1/2 pounds of aniline, 0 7/7 of a pound of toluidine; 0 4/5 of a pound of anthracene, and 0 9/9 of a pound of toluene. From the last named substance is obtained the new product known as saccharine, which is 230 times as sweet as the best cane sugar.

The Grand Union hotel, New York city, has published a useful little memorandum book which will be mailed to any address on receipt of a 2c stamp.

Address, "Advertising Department,"
GRAND UNION HOTEL,
New York City.

NATURAL GAS.

An Anticlinal Theory as to Its Deposit—How Best to Tap It.

The recent introduction of natural gas into general use as a source of heat for industrial and domestic purposes, has raised it from the rank of a mere curiosity to one of the earth's most valuable treasures.

This new fuel, which bids fair to replace coal almost entirely in many of our chief industrial centres, has not received that attention from the geologist which its importance demands. So far as the writer is aware, nothing has been published on the subject which would prove of any value to those prospecting for natural gas, and it is the existence of this blank in geological literature that has suggested the present article.

Practically all the large gas wells struck before '82 were accidentally discovered in boring for oil; but when the great value of natural gas became generally recognized, an eager search began for it in Pittsburg, Wheeling and many other manufacturing centres.

The first explorers assumed that gas could be obtained at one point as well as another, provided the earth be penetrated to a depth sufficiently great; and it has required the expenditure of several hundred thousand dollars in useless drilling to convince capitalists of this fallacy, which even yet obtains general credence among those not interested in successful gas companies.

The writer's study of this subject began in June, '83, when he was employed by Pittsburg parties to make a general investigation of the natural gas question, with the special object of determining whether or not it was possible to predict the presence or absence of gas from geological structures. In the prosecution of this work I was aided by a suggestion from Mr. William A. Earseman, of Allegheny, Pa., an oil operator of many years' experience, who had noticed that the principal gas wells then known in western Pennsylvania were situated close to where anticlinal axes were drawn on the geological maps. From this he inferred there must be some connection between the gas wells that had been struck in western Pennsylvania and West Virginia, and carefully examining the geological surroundings of each, I found that every one of them was situated either directly on, or near, the crown of an anticlinal axis, while wells that had been bored in the synclines on either side furnished little or no gas, but in many cases large quantities of salt water. Further observation showed that these wells were confined to a narrow belt, only one-fourth to one mile wide, along the crests of the anticlinal folds. These facts seemed to connect gas territory unmistakably with the disturbance in the rocks caused by their upheaval into arches, but the crucial test was yet to be made in the actual location of good gas territory on this theory. During the last two years I have submitted it to all manner of tests, both in locating and condemning gas territory, and the general result has been to confirm the anticlinal theory beyond a reasonable doubt.

But while we can state with confidence that all great gas wells are found on the anticlinal axes, the converse of this is not true, viz: that great gas wells may be found on all anticlinals. In a theory of this kind, the limitations become quite as important as, or even more so than the theory itself; and hence I have given considerable thought to this side of the question, having formulated them into three or four different general rules (which include practically all the limitations known to me, up to the present time, that should be placed on the statement that large gas wells may be obtained on anticlinal folds), viz:

(a) The arch in the rocks must be one of considerable magnitude.

(b) A course of porous sandstone of considerable thickness or if a fine grained rock, one would have extensive fissures, and thus in either case rendered capable of acting as a reservoir for the gas, must underlie the surface at a depth of several hundred feet (500 to 2,500.)

(c) Probably very few or none of the grand arches along mountain ranges will be found holding gas in large quantity, since in such cases the disturbance of the stratification has been so profound that all the natural gas generated in the past would long ago have escaped into the air through fissures that traverse all the beds.

(d) Another limitation might possibly be added, which would confine the areas where great gas wells may be obtained to those underlain by a considerable thickness of bituminous shale.

(e) Very fair gas wells may also be obtained for a considerable distance down the slope from the crest of the anticlinals, provided the dip be sufficiently rapid, and especially if it be irregular or interrupted by slight crumples. And even in regions where there are no well marked anticlinals, if the dip be somewhat rapid and irregular, rather large gas wells may occasionally be found, if all other conditions are favorable.

The reason why natural gas should collect under the arches of the rocks is sufficiently plain, from a consideration of its volatile nature. Then, too, the extensive fissuring of the rock, which appears neces-

sary to form a capacious reservoir for a large gas well, would take place most readily along the anticlinals where the tension in bedding would be greatest.

The geological horizon that furnishes the best gas reservoir in western Pennsylvania seems to be identical with the first Venango oil sand, and hence is one of the Catskill conglomerates. This is the gas rock at Murraysville, Tarentum, Washington, Wellsburg and many other points. Some large gas wells have been obtained in the subcarboniferous sandstone (Pocono), however, and others down in the third Venango oil sand (Chemung).

In Ohio, gas flows of considerable size have been obtained deep down in the Cincinnati limestone, while in West Virginia they have been found in the Pottsville conglomerate; hence natural gas, like oil, has a wide range through the geological column, though it is a significant fact that it is most abundant above the black slates of the Devonian.—*Prof. I. C. White, in Age of Steel.*

HONDURAS MINING COMP'YS

The Honduras Mining Company, —J. P. Imboden, Supt.—
Honduras, C. A., Nov. 11, 1886.

The following report by General Manager Imboden, covering the work done at the mines up to Oct. 1, '86, is published for the information of the stockholders:

YUSCARAN, HONDURAS, C. A., Oct. 1, '86.
The Honduras Mining Company, 140 Nassau Street, New York:—GENTLEMEN: Below I hand you a report on our prospects and the general outlook of the interests in my charge, and I am glad to say the future all looks well for us. In my letter Sept. 1st, I gave you to understand we were doing good work at the Hydraulic works, and I am rejoiced to say that the work has all improved, and is going on well. The Giant has worked quite a lot of good ore, and last week we struck a "pillar" of very fine ore, assaying 50 oz. silver, \$28 gold on an average, though a sample gave assay of 320.30 oz. silver and \$62 gold per ton. We are taking out ore of an average (daily assay) of from 50 oz., to 70 oz. per ton from this vein, and the average rock we get from the washings gives from \$27.50 to \$45 per ton, and we are just now touching the ground where we had expected to find ore of value. The "vein" shows an average of 20 inches thick. Of course I think it will prove a "pillar," but quite a large and long one, but we are now where we may expect to get good ores all the time, and out new "veins" and "pillars." The slates all show a fine paying color in gold, and I am under the belief we will find it advisable to run it all through the mills after extracting the poor stuff by means of "grizzlies" outside the bins. This is the opinion formed by Mr. Silas Gaydon, my Hydraulic foreman, who has had years of experience in such work. In my last I told you I thought we could count on supplying a 10 stamp mill with concentrating ores. I am confident we could count upon that from the Hydraulic works, and count upon it all giving an average of 30 oz. per ton. I mean such ores as we would not care to have treated by the Reduction Company, but concentrate by our own process, and give them the richer ores and the concentrates. My opinion in regard to the mill is identically the same as expressed in my letter of Sept. 1st. That we should have a concentration mill there can be no doubt.

I told you that I hoped on the 20th of Sept. to ship you a nice consignment of bullion; this was not done. The reduction company had trouble with their ditch line, and were perfecting the erection of steam for working which prevented their doing work in Sept. Mr. Gibson will to-morrow begin hauling our ores to the mill and during the wet season will put in 3 to 4 tons, (all the reduction mill will now treat) per day, and as soon as roads get better he will double or quadruple that amount.

I am doing nothing in our shaft, waiting for dynamite, and am concentrating all my efforts on the Hydraulic. The extraction of this ore is cheap and it is good. I am trying to economize all in my power. Money is almost exhausted in Honduras, and we must depend upon our supply from home. Greenbacks are worth 30 and 35 per cent. in Panama. I cabled of this matter to the office in New York and gave estimate to run shaft work and the Hydraulic per month at \$2,000. This includes the hauling of ores, &c.

We put the Lefell wheel in shape for running again. I have made it better than when it was new, but I will manufacture a new wheel here, a duplicate of the St. Elena stamp mill wheel. The Pelton is the best wheel in the world, and will do more work with less water than any wheel now made. I have the material here that I can get the wheel made.

I must again allude to our Hydraulic mine. I think that we will find it for the next two or three years the best mine in the "Mineral." I mean what I say. We will take out more ore at less cost and of better quality than any other mine in all this

group, and we will find the introduction of this machinery was not a fault, but a wise and prudent move. I assure you that all my expectations are verified, and we will reap the reward we were expected. I will say that so far we have encountered nothing in the shape of rock, and the slates are all easily cut and washed by the pipe. I would like better if the ground was a slight bit more tough as the sides of our cut would stand better. In a few months I want to purchase a smaller Giant than the one we use, as it will take less work to handle and will do ample work. I like the Giant used in the Southern states, made at Chattanooga, and without the "deflector," such as we have now. Could my friends see our works now they would readily perceive that the writer of the slanderous and cowardly letter in the "Engineering and Mining Journal" was an enemy who would stab in the dark and whose hand and tongue were used for pay and without knowledge of his subject. Thank God, our works stand for more than words, and our mines stand as monuments, proving the false and deep dyed scoundrelism of his heart. This writer got his information of Gen. Streber, than whom there is not a more cowardly, sneaking poltroon living in all the world. His bitter enemy emanates from the fact that he wanted to use me in defrauding the Yuscaran Company of property which they had a right to, and his bluster only resulted in discomfiture to himself.

This fellow, with his strikers, are the men who are trying to hurt us, whose cowardly attacks are made in the dark, and whose hired assassins are afraid to father the falsehoods which they have accepted blood money to write. These are facts, and I boldly stamp the writer of that article as a perjured wretch who was purchased to do his work from information given him by men who are unworthy the name of men. I mention these things because I am justified in denouncing the lie, and to assure the skeptical that we have all here that we have ever claimed, and to invite inspection of our work and the value of our mines. That we have failed in time of completion of our work, and the reaping of results I have to admit, but I say that for the money expended and time occupied by us in our work, it will compare with anything in the States. The difficulties over which we had no control were greater than we contemplated, but now we have overcome them, and we are as sure to make our results as that I write you this letter, and today I am more assured of success than at any moment since I knew the Guayabilas, and I affirm that we will not fail in our results.

The Platero Mining Company, The Gibraltar, The St. Elena, The Yuscaran and The Honduras are all that has been claimed for them, and we are on the direct road to success, provided we keep our work intact and take all the advantages of our ores which we should do.

I am exceedingly anxious to know that the plans are perfected for the stamp mill and the ores.

I am, gentlemen, yours faithfully,
J. P. IMBODEN,
Manager The Honduras Mining Company.

It is customary with some mechanics to test new boilers, or old ones which have undergone repairs, by simply subjecting them to a higher steam pressure. Why any intelligent person should do this passes our comprehension. If a boiler is known to be strong enough to sustain a certain pressure, there is no earthly reason to subject it to that pressure. If it is not absolutely certain that it will safely sustain any given pressure, then it is the height of folly, and it incurs a risk that no man can afford to take, to test the boiler at such a manner that, in the event of the boiler not proving strong enough to sustain it, an explosion will inevitably occur.—*American Miller.*

The tendency to employ cheap engineers is, no doubt, a fruitful cause of disaster, and under careless management the best boiler may be ruined in a week or less. The desire for excessive pressures, especially on boilers that have been some years in use, and that are not of sufficient capacity for the work required, is another fruitful source of disaster. Steam users in many cases forget that with the enlargement of the wheels, the increased production they should add correspondingly to their boiler power. They often try to provide for this increase of product by ordering their engineers to increase the pressure on the boilers. This is wrong, and it invites disaster.—*Boston Commercial Bulletin.*

The syndicate of Chicago capitalists who made the natural gas discovery while prospecting near Oxford, Benton county, Ind., are engaged in boring a second well on their lease of 1,500 acres of land. The well now being has reached a depth of 250 feet, and will be extended to a depth of 1,000 or 1,500 feet. Gas was struck when 100 feet below the surface, but the flow was suppressed in order to sink the well deeper. It is stated that, in case gas is found in a sufficient paying quantity, it will be transmitted to Chicago through pipes, to be used by manufacturers. Gas is still flowing from the well.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always* when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

AMERICAN INDUSTRIES.

How The Products Are Gaining Markets Over the World
—The Future Prospects.

There is no sentiment in business—"business is business," the world over. Individuals transact business with each other from a purely business standpoint. Nations, in their transactions, are governed by the same universal principle. A New Zealand correspondent of the London *Ironmonger*, in explaining why the people of that island prefer Yankee-made iron and steel goods to those of English make, says:

"We should prefer to do business with you, but you must not ask us to take badly-finished, old-fashioned goods, which, no matter how they satisfied our forefathers, will not do for us. Would you be surprised to hear that no carpenter in New Zealand will use from choice an English hammer, saw, brace or auger-bit? No buggy-builder will use English coach bolts and tire bolts if American ones can be obtained, even at 10 per cent. more money than the English, because he can pick up a Yankee bolt and apply it immediately to his work, and with its nice square cut thread there is less chance of nuts becoming loose. What is the case with the English bolt? He will search a gross over and find every nut 'jammed' so hard on the bolt that it has to be taken to the vise and there oiled and eased. This takes time, and as time is money, he cannot be blamed for preferring the Yankee article. I shall not touch upon the American axe question more than to say that the loss of trade to England is through sending out rubbish at first, and not caring to be galled by our own kith and kin, who ought to have known better, we went elsewhere for what we wanted 'and got it.'"

The above furnishes a most excellent business lesson. It shows the advantages of doing business "on the square." Just, honest and upright dealing is always the most profitable in the end. Whatever you do, do it well.

American mechanics, as a class, have no superior anywhere, either as designers, creators or workers. They are also the most intelligent and ingenious. Common observation at home and abroad and the well-known workings of our common-sense system furnish abundant proof of the former. The records of our patent offices, which record more inventions annually than all the other patent offices in the world put together, give ample proof of the latter. If more is wanted, the telling fact may be stated that at the recent international electric exposition at Paris, five gold medals were awarded for the five greatest inventions or discoveries, and all five crossed the ocean to the United States!

Herbert Spencer, a man strongly wedded to his country, which has greatly honored him and which he in turn has greatly honored, says the United States has the best mechanical appliances and turns out the best mechanics in the world.

With all these advantages, added to that of "square work," as shown in the above extract from a New Zealand letter, published in a leading English technical journal, is there any reason why we, as a nation, should not ultimately attain to supremacy in the world's industries? Are we not already fast approaching that point? Let us examine a few figures:

From '70 to '80 the manufactures of France increased by the valued amount of \$230,000,000; Germany, \$430,000,000; Great Britain, \$580,000,000; of the United States, \$1,030,000,000. In ten years we had increased the total value of our manufactures \$450,000,000 in excess of the increase in Great Britain, hitherto the imperial mistress of the industrial world! Is it any wonder that Mr. Gladstone's keen forecast should have led him, years ago, to prophesy that the United States "would eventually become the world's head servant in the world's great household?" Notwithstanding the progress we have already made, we are in fact, but just beginning to develop our resources.

The Cleveland *Plaindealer*, in this regard, most eloquently and truthfully says: "We are just beginning to develop our resources while many of the nations find their well-nigh exhausted. Even now, the superior intelligence of our mechanics can compete against the cheaper labor of Europe. Even now, in spite of their cheap labor, we can lay down our steels in Sheffield, our certain low grades of cotton in Manchester, our electroplate in Birmingham, our watches in Geneva, and undersell European manufacturers at their own doors. If this is the beginning, what, then, of the possible future? And then add to this how just now our markets are being rapidly extended under the impulse of electricity and steam as never before.

"We are next neighbor to all the nations; to South America, just quivering with its new life; to Japan and China, just waking up from the sleep of ages; to Africa, with its wonderful and mysterious future greatness. Within these 20 years it was as if the dead bones of the nations had been lying into place and a living soul had entered them. It is the dawning of Christian civilization for a billion of people who do not yet enjoy it. And Christian civilization means higher, nobler material, as well as intellectual and spiritual wants. After the mis-

sionary always goes commerce. Five hundred American steel plows went to the native negro Christians of Natal, South Africa, last year. All the millions of Asia and Africa are going to have their civilized cravings, as we do, some day. India, just beginning to be a little Christian, took \$12,000,000 worth of cotton goods last year. What may all Asia want 100 years hence? What may Africa want 100 years hence? With those vast continents added to our market, and all our natural advantages realized, what is to prevent our country from becoming the mighty workshop of the world?

"Realize the resources of our agriculture, equal to feeding 1,000,000,000 souls! Fully develop our mining and manufacturing industries, which would be enough to sustain the whole human race, gain the pre-eminence in every market around the globe, and become the handmaid of the nations." Did not Mr. Matthew Arnold say aright in his lecture to us a year and a half ago, that 'America holds the future'?"

Discovery of Gold in Tasmania.

The following statements appear in the Hobart *Daily Telegraph* of August 3: "The recent development of the Mount Lyell gold discovery bids fair to eclipse anything of the kind hitherto found in Tasmania, and even to rival the famed Mount Morgan of Queensland, the value of which is counted in millions. Mount Lyell is situated about seventeen miles northeast of Macquarie Harbor, on the west coast of Tasmania. The miners, whose long and indefatigable labors have at last been crowned with such splendid and well deserved success, have been prospecting in this locality for some ten years and more. At an early period of their operations they found some very coarse reef gold, giving every indication of an exceedingly rich reef or lode in the vicinity. Reasoning from the indication, the prospectors (who had secured a prospecting area of fifty acres under a protection order) commenced a systematic search for the lode, carrying up a tail race and working away a large face before them and obtaining gold in considerable quantity as they proceeded. The ground presented extraordinary difficulties, being encumbered with large masses of tin ore, rock and cement, which required to be blasted with dynamite. The tail race was carried through a peculiar formation, and on one of the miners employed by the prospectors they drew down the hydraulic hose which they were using and the jet was left playing on the side of the cutting. After a while the man's attention was caught by the rich appearance of gold near the jet, where the stream was depositing it so as quite to gild the soil. Further prospecting has revealed to some extent the extraordinary richness of the deposit. It would appear at first sight to be a dike formation, but its exploration so far indicates that it is of hydrothermal origin, like the celebrated Mount Morgan mine. Several assays have been made, giving magnificent results. We know of three which were respectively at the rate of 164 ounces, 187 ounces and 348 ounces to the ton."

Government Instruction.

We received intimation several weeks ago, and inadvertently omitted to mention it in the *Journal*, that owing to the small number of candidates there will be no fall sitting of the board of examiners for colliery officials. We are glad to learn that the government intends to provide adequate means whereby prospective candidates shall be enabled to have instruction in surveying, etc., etc., imparted to them by a qualified teacher. The P. W. A., through its Secretary, has repeatedly brought to the notice of the government the fact that as matters presently stand it is next to impossible for the workmen at our collieries who have the laudable ambition to qualify themselves for mine bosses, to obtain the knowledge of surveying necessary to a successful examination, and we are therefore glad to hear that much importuning is to meet with reward. The government will likely appoint competent men as instructors, one for Nova Scotia, proper and one for Cape Breton, who will form classes in the several mining localities, and have the privilege, from the mine owners, of taking their scholars into the mine on 'idle days' or after the pits knock off in the evenings. Edwin Gilpin, the capable inspector, besides filling that position will meantime act as deputy commissioner of mines. The arrangement we believe only temporary, and preparatory to a change for the better in the mines department. The many improvements effected during the past few years in the laws regulating our coal mines, at the request of the workmen, should afford all pleasure, and encourage the workmen to seek for still further improvements and concessions.—*Trades Journal, St. Lawrence, N. S.*

The process consists in burning one gramme of the coal or fuel in a small platinum crucible, supported on the bowl of a tobacco pipe and covered by an inverted glass test tube, through which is passed a stream of oxygen, while the whole is placed under water in a glass vessel. The oxygen is fed into the test tube by a movable copper tube, which may be pushed into the test tube and immediately over the crucible. The coal burns away in a few minutes with very intense heat, and the hot gases escape through the water, the bubbles being broken up by passing through sheets of wire gauze, which stretch between the test tube and the walls of the vessel containing the water in which it is placed. The temperature of the water is taken before and after the experiment, and from the figures thus obtained the heating power of the coal is calculated.—*Progressive Age.*

BOILER FLUES.

Experiments Showing Their Holding Power in Preventing an Explosion.

During the recent meeting of the master mechanics, the question of the holding power of boiler tubes, when beaded and unbanded, was indirectly brought up, and as a recent case of boiler experience has quite a bearing on that point, as well as being of general interest, we give the account as it has been given to us, knowing the statement so far as the important facts are concerned, to be correct.

A new engine and boiler of modern design and best construction had recently been erected and ran with promising satisfaction for some days. The first indication of any thing being wrong was a leakage around the valve stem of the engine. It was the aim of the proprietor to run at 80 to 100 pounds boiler pressure, but the safety valve lever was only graduated to 90 pounds, and in order to determine the action of the engine at 100 pounds extra weights were ordered to be placed upon it. The pressure gauge indicating but 80 pounds, and the safety valve continuing to blow, more weights were added until the idea occurred to some one that perhaps the pressure gauge pipe was clogged. This was found to be the case, and after being cleaned out and the gauge replaced the hand immediately went around to the pin showing 150 pounds. Further investigation showed an astonishing state of affairs. The ends of the boiler above the flues had been forced out, leaving the stays loose from the head and the boiler forced out of shape in other respects, and yet the flues set in the ordinary way held the boiler head securely, even after the stays had given way.

Just what pressure was reached has not as yet been definitely determined, but the cylinder oil for which a fire test of 600° is claimed was completely burned up, and the babbitt bushing in the valve rod stuffing-box was absolutely melted by the heat of the steam in the steam chest. It is proposed to ascertain if possible the melting point of this same piece of babbitt metal and so determine the actual pressure. No doubt various opinions will be expressed in regard to this in many ways; prominently as to whether it was a good or bad boiler. Some may say it proved to be weak in the staying. We do not see that this is necessarily so, for possibly the holding power of the flues was greatly in excess of what was required and the shell might have been on the point of rupture when the stays gave way. Everybody will be ready to say they all must have been a pack of fools, but as a matter of fact they are nothing of the kind, and we are led to believe it all comes from what is often considered to be a good trait in an employee—that spirit which carries out what he understands to be the order, without regard to consequences.—*American Machinist.*

Borneo Antimony and Quicksilver.

The quantity of antimony exported shows a further falling off when compared with previous years. The deposits of high-class ores, suitable for shipment to the home market in Upper Sarawak (to which district mining operations are principally confined) appear to be well-nigh worked out, while prospecting in other districts has given no beneficial result. Efforts have been made, and are still carried on, to open up a deposit in Rejang; but, so far, very little high-class ore has been obtained. The reduction of low-class ores too poor for shipment has been tried by the company, which leases the right to work minerals from the Sarawak government, and has met with marked success. The regulus produced compares favorably, as regards the percentage of antimony it contains, with perhaps the best known brand in the London market, while the process of "starring" the metal, in order to satisfy the fancy of consumers, is effected successfully. Though consumers appear to imagine that "starred" metal (the effect of which gives the surface of the shabs a fern-like appearance) denotes purity, the reverse is in reality the case, as the presence of well defined "star" actually denotes the existence of impurities in the metal. The production of quicksilver continues to be carried on; but very little good cinabar is now obtainable, and the quality of the ore at present treated is extremely poor. Though a considerable reward is offered for the discovery of a workable deposit of cinabar, no such fresh find has been met with.

WRITING TO NATURE regarding various fats which are used to smooth and bind the surface of various kinds of apparatus, such as air pumps, stop cocks, etc., H. G. Madan says: "Melted india rubber answers fairly, but it has too little body and too much glutinosity; moreover, it does, undoubtedly, in course of time, harden into a brittle resinous substance. Vaseline is quite without action on brass, and never hardens, but it has not sufficient tenacity and adhesiveness. A mixture of two parts by weight of vaseline (the common thick brown kind) and one part of melted india rubber seems to combine the good qualities of both without the drawbacks of either. The india rubber should, of course, be pure (not vulcanized), and should be cut up into shreds and melted at the lowest possible temperature in an iron cup, being constantly pressed down against the hot surface and stirred until a uniform glutinous mass is obtained. Then the proper weight of vaseline should be added and the whole thoroughly stirred together. This may be left on an air-pump plate for, at any rate, a couple of years without perceptible alteration, either in itself or the brass.



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-AT-

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FOR THE WEEK ENDING

SATURDAY, NOVEMBER 13, 1886.

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THE TRADE OUTLOOK.

Perhaps one of the most difficult tasks any reviewer could undertake at present would be to reconcile the conflicting current indications of trade. Business continues quite active in all departments of manufacture, but the volume of trade has slackened perceptibly during the past two weeks, and the number of business failures has increased out of all proportion and will not bear comparison with the same period even of '85, when failures were more numerous than ever before. This freak cannot be accounted for upon any known hypothesis, as heretofore the number of business failures has always diminished in a ratio corresponding with the increase of business activity, and have always increased in times of business stagnation. The only satisfactory explanation of the phenomenon, therefore, is that it is a freak, having no special significance, and the presumption is that if business continues prosperous, there will be a remarkable decline in the number of commercial failures towards the close of the year. The falling of the volume of commercial transactions is readily accounted for by the unreasonably mild weather which has continued up to the opening of the present week. This is amply verified by current reports of increasing activity during the past four or five days, and as the season advances, it is safe to presume that trade will continue to grow more active.

No important changes have taken place in the prices of products but a slight advance in manufactured articles is noted. Prices of grain remain substantially unchanged, pig iron has not advanced, but manufactured articles of iron are slightly higher. The export trade of the country has fallen off considerably and imports increase in about an equal ratio. This, however, is but an evidence of our prosperity. Our purchasers abroad have always increased as our exports have decreased during periods of commercial prosperity at home; and the only danger to be feared from it is the exportation of large amounts of our coin currency which may result in a contraction of the volume of money and a shrinkage of values. Thus far, however, the purchase of American securities abroad has more than made up the deficiency caused by the increase of imports over exports. We are paying now several millions monthly on account of adverse merchandise balances, but the gold sent here in payment of securities purchased more than equals the difference.

The most prominent disturbing element now in sight, excepting the possibility of an early agitation of the tariff, is the complication likely to arise out of the enforced retirement of the national bank circulation, by reason of the redemption of the three per cent bonds. The bankers object to being forced to retire their circulation, and a combination between them might seriously disturb the business of the country. The administration sympathies with them, and no doubt, President Cleveland will recommend some scheme to congress next month for their relief. The fact, however, that under the present policy of permitting the banks to issue money, places the business of the country at the mercy of any strong combination of bankers ought to be sufficient reason of itself for the retirement of the bank notes, and ought to be argument enough against any sort of legislation looking to an extension of the privilege.

Nothing can be plainer than that the issuing of circulating notes is no necessary part of the business of banking. The proper function of a bank is to receive money on deposit and lend out. It acts as an intermediary between the owner of the money and the borrower, and its earnings from the service it renders in this way are perfectly legitimate. But with issuing money it need have nothing to do, and a government that complains of a surplus revenue, would be stupid to continue paying interest upon a large debt for the sole purpose of perpetuating a privilege in the hands of corporations which the constitution and common sense both say belong to the government itself. Banks are carried on profitably all over the country, some by private persons, some under state charters and some even under the national bank act, which do not issue a dollar's worth of circulation; and there is no reason why the banks now enjoying the privilege of issuing notes cannot do likewise. Nor is there any reason why the government should pay a bonus or premium to any combination of capitalists out of the taxes collected from the public. The

coming national currency is to be gold and silver coin and government paper, and nothing else, and the sooner the system is established the better it will be for the business interests of the whole country.

Railroad building has made more progress this year than in '84 or '85. The report of mileage built to date is over 5,000 miles, which has only been exceeded in the four years of '72, '81, '82 and '83. The iron markets continues very firm with trade failing active. Many of the leading furnaces in the east are supplied with contracts well into '87. The western business has been large at all centres, and the market continues strong. Most of the selling has been for forward deliveries, and sales are reported running in January, '88.

The anthracite coal trade continues to be quite active notwithstanding unfavorable weather. Transportation facilities are still insufficient and orders abundant. The threatened strike in the Shamokin region has been averted by the companies making small concessions to the miners, and the tonnage continues to be very large. Producers of bituminous coal complain that prices received do not furnish a fair profit, but admit that the demand is good and current rates very firm.

THE COKE TRADE.

There is a good demand for coke and the business outlook for the trade is growing brighter every day. Demand has all along exceeded supply, but the restriction was solely on account of the scarcity of cars. This drawback is being gradually overcome and a prosperous winter was confidently looked forward to by the operators. Just at this juncture there are indications of a renewal of the troubles of last winter between operators and employees. The present difficulty grows out of the presentation by the miners' association of the Connellsville region of a series of demands to the operators. The substance of these are as follows:

That uniform rents be charged for houses at the rate of one dollar per month for each room; that one dollar per month be charged for coal and that it be carried to the house; that scales be placed on every tipple; that coal be paid for by weight instead of measurement and that check-weighmen be allowed; that wages be paid every two weeks in cash, without deduction for store orders; that car-workers' wages be reconsidered and a new scale be established for them; that trapping boys' wages be advanced from 68 cents to \$1 per day, and that the miners' association be recognized as the only organization representing them.

The operators do not say openly what will be done with these demands, but there are indications that they will in part, if not wholly, be rejected. Iron manufacturers are laying in a large stock of pig iron so as to be ready for a famine. Of the 12,000 men in the coke region, half are controlled by the miners' association and half by the Knights of Labor. They are at open war, but the Knights will support the association in any demand they consider just. Their executive board meets soon to consider how many of these demands shall be endorsed, and it will also ask a further conference with the operators.

The association and the operators have each appointed representatives to meet together in Pittsburgh on the 18th, and it is to be hoped that they will arrive at some satisfactory compromise, and thus dispel the fears now entertained of a prolonged and costly struggle.

ACCIDENTS IN MINES.

The HERALD is indebted to John Wiley & Sons, importers and publishers, of 15 Astor Place, New York, for a copy of "Sawyer's Mine Accidents, Causes, etc.," occurring in the North Staffordshire coalfield, England. The book gives most elaborate details of the formation of the coal seams, the manner in which they are worked, the difficulties and dangers attendant thereon, the systems of timbering in vogue, with the advantages and faults of the latter fully explained and an argument as to the applicability or avoidance of the same elsewhere, explanations as to the manner in which so many accidents from falling roofs and sides occur and how preventatives may be applied; there is no branch of mine accidents in which the casualties and fatalities are so numerous as those which arise from falling rock and coal, and any suggestions which will lead to their diminution are certainly deserving attention and application by mine owners and colliers—

The large mines and 215 coke ovens of the Isabella coke works, at Cokeville, Pa., are in full blast. The coke formerly stockpiled in the yards has all been shipped away, and the new product is shipped away as fast as it is drawn from the ovens. At present from 250 to 300 men are receiving steady employment in the mines and about the crusher and coke ovens.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy, and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

To Work a Steep Seam.

Editor Mining Herald and Colliery Engineer:

SIR:—Allow me to ask through your paper for the experience of some of your readers with the working of steep seams rising at say from 6 to 8 inches per yard—what I want particularly to know is how the coal is transferred from the face of the boards to the flats. As the gradient precludes putting by ponies I understand there is some simple mode of incline with suitable portable sheaves and chains to lower the full tub down the board, and at the same time haul up the empty one. I would feel very much obliged for a description of the process and one or two sketches illustrating the wheel, brake, &c., and the general application for tubs containing 8 cwt. of coal.

Yours, &c.,

P. V.

Birmingham, Ala., Nov. 4, '86.

To Test Pipes.

Editor Mining Herald and Colliery Engineer:

SIR:—I should feel greatly obliged if you would insert in your next issue. Will any of your able correspondents please answer the following: Which is the best and safest rule for calculating the strength of cast iron pipes—I mean the pressure they will sustain safely?

Yours Respectfully,

STUDENT.

Cleveland, Ohio, Nov. 4, '86.

Queries on Boilers.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any correspondent:—1st. Give the fittings required for a boiler? 2d. What kind of boiler do you consider is the best? 3d. What material are boilers made of? 4th. Give rule to calculate boiler power for engine power. 5th. What height of water should be in a boiler when working? 6th. What is meant by using steam expansively? 7th. Give rule to find weight required on the safety valve of a boiler?

Yours, &c.,

O. V.

Houtzdale, Pa., Nov. 5, '86.

Tractive Power of Locomotives.

Editor Mining Herald and Colliery Engineer:

SIR:—To find the tractive power of locomotives "Molesworth" gives the following rule:

$$T = \frac{D^2 P L}{W}$$

D = diameter of cylinder in inches, P = mean pressure of steam, L = length of stroke in inches, W = diameter of driving wheel in inches.

1. Is this rule for engines of the good type (six wheels coupled), where the whole weight of the engine, boiler, and all the parts of the engine only the tender are on the driving wheels? If so, what is the rule for the tractive force of the engines of the passenger type (four wheels) with bogie wheels in front, and also for tank engines? An answer to the above question will oblige.

Yours, &c.,

F. L.

Pottsville, Pa., Oct. 30, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—In answer to "Student" of Streator, Ill., a regulator should be placed as near the intake shaft as possible, as splits made far into the workings of a mine have but little effect in increasing the quantity of air.

Relating to his second question, I would say that the air should go in by the roadway and return by the pipes.

Replying to his third question, as to ventilating a mine by an exhaust or propelling ventilator. Propelling air the best and safest mode of ventilating mines, as there is less danger in filling the workings up with explosive gas. The danger of having the fan at the up-shaft would be, if there was a fall of roof at or near the downcast shaft, every stroke of the fan would empty out the air which presses in the gas. Thus the mine would fill up at once with fire-damp and cause explosion before the men could be got out. Otherwise by propelling the air in at the downcast shaft, and a fall

happening at the upcast, every stroke of the fan would produce more weight upon the pent up gas, and more time would be allowed in relieving the men which happened to be employed therein.

Yours truly,

R. F.

Lehigh, Iowa, Nov. 5, 1886.

Desires Size of Plant.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following in your next issue:

1. What shafts and plant would be required to raise 1,000 tons of coal per 8 hours from a coal field of 2,000 acres, 5 ft. 6 in. thick, and average depth of 250 yards?
2. How would you proceed in sinking if you came upon a large influx of water?
3. Sketch the form and give the size of shafts for single and double cages.

Yours, &c.,

J. D. H.

Tamaqua, Pa., Nov. 9, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—In answer to "Student"—1st. The nearer the intake that air is split the better, and the nearer the upcast that the return air of the splits are joined the better. Reason—the further that air travels before being split the quantity decreases by the expense of friction.

2d. I have always observed that the air goes in by the air trough or pipes and returns by the roadway.

3d. The exhausting by fan and furnace, &c., has the preference over the other system of blowing in. The ventilation is more efficient, less expensive, &c. I have never known a pit ventilated by the process you mention, although some good men have attempted to establish a principle.

Yours, &c.,

M. D.

Pittston, Pa., Nov. 8, '86.

Safety Lamp and Gas.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you kindly insert in your next issue the following questions, hoping that some of your able correspondents will reply:

1. Explain the principles of a safety lamp and give the peculiarities and state which you consider the best and why.
2. How long should it be after the fire boss goes into the mine before the miners are allowed to enter the mine?
3. If a two horse power produces 2 lbs. pressure, what horse power will produce 6 lbs. pressure?

Yours truly,

ALCYNTHUS.

West Elizabeth, Ally. Co., Pa., Nov. 3, '86.

The Air Passed.

Editor Mining Herald and Colliery Engineer:

SIR:—In answer to the inquiries "Q. U. C." respecting the quantity passing in a circular airway of 5 ft. diameter if 25,000 ft. passed through one 14 feet diameter (Question 1.)

$$1. \quad 14 \times 14 \times .7854 = 153.9384 \text{ area of large airway;}$$

$$2. \quad 5 \times 5 \times .7854 = 19.6350 \text{ area of small airway; then,}$$

$$25,000 \div 153.9384 = 162.4,$$

which would be amount passing through each foot of sectional area of large airway. Then,

$$25,000 \div 19.6350 = 127.2,$$

which would pass through each square foot of small airway; and for 19.6350 sectional area,

$$127.2 \times 19.6350 = 2497.572.$$

Answer, 2497.572.

Question 2.— $14^2 \times .7854 = 153.9384 \times 48$ (4 ft. in inches) $\times 5$ (5 strokes per minute) = 3694.2160 $\div 277.274 = 133$ gallons per minute. Answer, 133 gallons per minute.

Question 3.—1. Depth of shaft 300 yards = 900 feet; 2. Four empty tubs 4 cwt. each = 1,792 lb.; 3. Four tubs, each carrying 10 cwt. = 4,480 lb.; 6,272 lb. weight of load. Thus,

$$\frac{6,272 \times 900}{33,000} = 243 \text{ horse power}$$

of engine. 4. Dimensions of engine $30^2 \times .7854 = 706.8600$ area of cylinder. Then, 706.8600×50 (effective steam pressure) $\times 6 \times 2$ (length of stroke) $\times 22$ (strokes per one draw) = 9330552.0000. Then,

$$\frac{9330552.0000}{33,000} = \text{horse power,}$$

including allowance for friction. 5. size of drum 13 ft. diameter and 40,557 ft. circumference. Number of revolutions in 900 ft. (depth of shaft) = $900 \div 40.557 = 22$ approximately. 6. Then $9 \text{ hours} \times 60 \times 60 = 32,400 \div 54$ (seconds per draw) = 600 $\times 2$ (lois per draw) = 1,200 times per day, which is an over-estimate when all the contingencies are provided for. 7. Size of pulley wheels 10 ft. diameter. 8. Strength of ropes, $1\frac{1}{2}$ diameter steel rope.

Yours, &c.,

J. H. D.

New York, Nov. 6, '86.

BEFORE THE INSPECTOR.

Important and Interesting Points Relative to What Constitutes a Vacuum.

Inspector. "What do you know about condensing engines?"

Candidate. "Not so much as I would like to."

Inspector. "What do you suppose a vacuum is?"

Candidate. "Absolute absence of atmospheric pressure."

Inspector. "Then, when you speak of a vacuum, in connection with a steam engine, you mean that the pressure of the atmosphere is removed?"

Candidate. "Yes, sir."

Inspector. "How much does this add to the efficiency of a condensing engine?"

Candidate. "If it is a perfect vacuum, it adds 14.7 pounds to the live steam pressure, minus friction, etc."

Inspector. "Can you get a perfect vacuum in the condenser of a steam engine, and if not, what is the reason?"

Candidate. "A perfect vacuum is unattainable, for several reasons; mechanical imperfections, such as bad joints, leaky valves, etc., but more than any other cause, for want of time. In full headway, say at 60 revolutions per minute, the steam is exhausted into the condenser 120 times per minute, or twice in each second, and the steam cannot give up its heat and be refrigerated so rapidly as to make a perfect vacuum. There is always a slight pressure in the condenser, or, to speak more correctly, there is not a perfect vacuum."

Inspector. "What is the average vacuum obtained with good working apparatus?"

Candidate. "Twenty-six inches."

Inspector. "Can you express it in pounds?"

Candidate. "Not legitimately; if a vacuum is space I do not see how there can be any weight to it. I might say that twenty-six inches is equal to 13 lbs. of atmospheric resistance displaced, but this makes the matter no clearer."

Inspector. "What is the reason a vacuum will not form when a condenser is hot?"

Candidate. "Because vapor is present in excess, and cannot be removed fast enough to enable the circulating water to condense it. If an engine stands for awhile, and the valves are leaky, the condenser will get hot, if it is of the jet variety. If it is a surface condenser it will not, if the circulating pump is going, as it generally is when steam is up."

Inspector. "What do you mean by a jet condenser, and what is a surface condenser?"

Candidate. "A jet condenser is one wherein the exhaust and the condensing water are admitted together; the steam exhausts directly into the body of the condenser itself. A surface condenser is a casting filled with small brass tubes. The condensing water is forced through these by the circulating pump, and the exhaust steam is admitted outside of these tubes, so that the condensing water and the exhaust steam never mingle, and have no connection with each other."

Inspector. "Has the surface condenser any especial value over the jet condenser?"

Candidate. "The very greatest. Before the surface condenser was introduced, all seagoing ships had to use salt water in their boilers, because the injection (condensing water) was taken from the sea and pumped directly back into the boilers. This rapidly destroyed them by scaling, so that in about five years the boilers were worn out. Some boilers lasted only three years, and they gave the engineers constant work to keep them that length of time. Since the surface condenser became general the life of marine steam boilers has been lengthened to twenty years and over, to say nothing of the decreased consumption of fuel by reason of cleaner fire surfaces and more careful regulation of the feed-water temperatures."

Inspector. "What are the chief causes of bad vacuum?"

Candidate. "Leaks of one sort or another. Air leaks into the condenser through all joints that are connected with it, and steam leaks in through defective valves. A very small steam leak will have a very great influence on steam flows into a vacuum at the rate of 1600 feet per second, say 19 miles per minute; at this velocity an apparently insignificant leak can pull the vacuum down an inch or two quickly.—Mechanical Engineer.

Travellers who visit the continental ports cannot fail to notice very significant indications of the growth of the trade in Russian petroleum. A new tank steamer for carrying this oil in bulk, the *Elclair*, arrived at Trieste from Batoum the other day, and similar shipments are being made also to Antwerp. Russian petroleum is also making its appearance at Brussels and Paris, whither it is conveyed from the ports in barges. There appears, indeed, to be a strong probability that the Russian mineral oil will gradually supersede the American. This new trade it is pointed out to be, is not unlikely to have an important influence on the Russian exchange. Practically it is a new export, in view of the recent decreased importance of the Russian grain export trade, it may perhaps be doubted that the Russian petroleum trade will result in any serious revival in the exchange rate, as a Paris contemporary hopes; but it will at all events, tend to check any decline in any case its bearing upon Russian finance is worth considering: *Manchester Guardian*.

WHAT IT COSTS.

The state supreme court in Pittsburg, on Nov. 1st, affirmed the decision of the lower court in the case of twenty-four coal miners convicted of conspiracy for connection with the great coal strike in Washington last year. The miners were sentenced to nine months' imprisonment in the Allegheny county workhouse, and were released on bail pending the decision of the supreme court with the exception of three whose terms have almost been completed.

MINERS' SAFETY LAMPS.

Some Interesting and Valuable Experiments Made With Them Recently.

W. Clifford, manager of the Clifford lamp company, England, writes as follows to the Sheffield Daily Telegraph:

Everyone who earns or has earned his bread in a coal-pit must be grateful for any effort to lessen the risks to human life which the collier runs in following his daily occupation—far beyond the general average of trades in this country. But it is important that such efforts should be more than the enthusiastic convictions of sanguine inventors, and that their results should bear the closest scrutiny, and the most thorough and public investigation. Last week I read a paragraph in your paper under the heading of "Evenings with a Welsh safety lamp inventor," being a description of certain experiments conducted in a workman's cottage at Pontypridd. In this paragraph it stated that the four safety lamps specially commended in "The Final Report of the Royal Commission on Mine Accidents" were fired by an apparatus operated by "M.," that the operator's own lamp was not fired, but withstood the utmost efforts directed to that end. The result was that the admiration of the colliers present broke forth in cheers. Now the same inventor, I believe, had a demonstration of a similar nature in the town hall (I believe), at Leigh, in Lancashire, shortly after the Wood End explosion with results equally satisfactory to himself. On this occasion there were present not only colliers, but a number of gentlemen connected with collieries, and with the miners' union, including W. Pickard, J. E. Read, in the Bolton journal that (so confident was Mr. Morgan in the superiority of his lamp), he stated to the audience that the offer of a competition £500 (by his principal, I believe), still held good. That the four lamps recommended by the royal commission were mere "death traps," and not "safety lamps"—that it was incumbent upon the owners of collieries to possess themselves of a real safety lamp, and that that was then before them. Now, sir, I do not think that tests with a laboratory foot bellows are of much value as negative tests—that is, I should not feel confident in the ultimate resisting power of a lamp, because it had withstood such a test, whether conducted in a cottage at Pontypridd, or in a hall at Leigh. Nor am I from my little experience of testing safety lamps going to deny that Mr. Morgan really did fire the four lamps. An eminent mining engineer and colliery owner in Lancashire offered to light the gas in his office with a Marseaut in my presence only a few days ago. My first step on reading the paragraph in your paper was to go to the Neepsend gas works and there have tested in the very powerful apparatus erected by the company's engineer a new Morgan lamp which my company possess, but finding the apparatus temporarily dismantled, I had to wait until today, when Morgan's lamp was fixed in the most explosive mixture of gas and air, moving at a velocity due to a little over half a pound per square inch pressure, in a trifle over one minute—a time, sir, that you will agree with me is not very great for a man to get out of a pit in the dark. Now, sir, we do not wish to take Mr. Morgan's money, though we have no doubt that the £500 could be forthcoming—the wealth and respectability of the firm of Nettlefold—whose support Mr. Morgan states he commands as a sufficient guarantee for that, but we should like to have a public test, or competition without the wager. We will under-take that our lamp shall be self-extinguishing in a current that fires Mr. Morgan's or any of the four recommended by the royal commission.

In another column of its paper the Telegraph gives the following result of the experiments to which Mr. Clifford refers:

Mr. Arnold Lupton, M. Inst. C. E., F. G. S., lecturer on coal mining at the Yorkshire college of science, Leeds, was engaged in making some safety-lamp experiments at the Neepsend Gas Works, Sheffield, yesterday. The experiments were made, we believe, in connection with Mr. Lupton's lecture on the subject of "Miners' safety lamps," in the Philosophical hall, Leeds, last night. The apparatus with which these tests were made was of the most powerful kind, admitting of the exploding of lamps which have hitherto been proof against any explosive mixture that has been directed against them. Several lamps were tried yesterday, with the result as follows:—

Name of lamp.	Duration of experiment.	Results.
Wm. Morgan's No. 1.....	2 38	Exploded the gas.
Wm. Morgan's No. 2.....	12 0	Gas continued to burn fiercely inside lamp; hot, but did not fire outside.
Evans Thomas' No. 7.....	15 0	The same results, but not quite so hot as Morgan's.
Bonnetted muelster, made by Mr. Davy & Sons, Derby	0 10	Exploded the gas.
Richard Purdy's Victoria lamp.....	0 2	Exploded the gas.
Clifford's No. 1.....	0 30	Lamp extinguished itself.
Ditto No. 2, with inner glass chimney, canted on one side.....	5 0	Lamp extinguished itself.

The 125 steamships plying between the United States and Europe cost \$100,000,000, employ 18,750 men, spend \$1,000,000 a month for coal, carry 500,000 passengers a year, and earn \$22,000,000 for passage money, exclusive of what is paid for freight.

COAL DEVELOPMENTS.

The Delaware, Lackawanna and Western coal company has lately completed a bore hole on the Askam tract, located several miles below Wilkes-Barre, Pa., which showed an aggregate thickness of one hundred and twenty feet of anthracite. Not a pound of coal has yet been cut from this tract.

The Pennsylvania coal company's new No. 1 shaft, on lands adjoining the Blakely road, in Lackawanna county, Pa., is now nearly completed, the third or east seam having recently been cut. The new opening when finished will show a depth of about three hundred feet.

The work of rebuilding No. 1 breaker of Carter & Co., at Coleraine, Carbon county, Pa., is completed excepting one side. Coal is being prepared with the other for furnace purposes, and a large number of the employees, who have been idle for several months, have been given employment.

The colliery at Gilberton, Pa., was to have been ready to resume shipments by the first of November, but that time has come and gone, and it is quite likely now that it will not be ready to resume before December 1st. The heavy timber work in the slope is requiring so much more time than was anticipated. It is perilous and tedious and requires considerable patience. Some of the employees of the colliery are engaged in the repairs, while two rock tunnels that are being driven affords others employment.

Lawrence & Brown, of the Mahanoy Plane, Pa., colliery, have laid a track from their colliery to the big breach on the right of the road leading to Frackville, Pa., and will commence filling it up with cinder. It will be a big contract, for the bottom keeps dropping out at intervals and disappears to the depths below. The road has been changed several times, and now rests on a pillar between two breaches. Last week when the C. & I. Co. men were blasting to change the pipe line, it was feared they would shake the pillars down, but they withstood the miniature earthquake and are seemingly as solid as ever.

LABOR TOPICS.

The mining industry of Westphalia, Germany, is depressed. Seven hundred men have been discharged.

Last month's pay is said to be the best that the miners of the Wilkes-Barre, Pa., region have drawn in several years.

The miners at the Enterprise colliery, Mount Carmel, Pa., have been granted the ten per cent. advance in wages asked for.

The expectation that the demand for a raise of wages, recently made by the miners of Northumberland county, would be conceded, appears to have been without sufficient foundation. Those at the Excelsior colliery at Mount Carmel have struck for an advance of 10 per cent. and there are not wanting indications that if they were in condition a similar demand to stand a strike the miners of the Union and Mineral Springs collieries would also go out.

The Knights of Labor of Western Pennsylvania on the 4th inst. formally espoused the cause of the twenty-one Washington county miners who have been remanded by the decision of the state supreme court to the county workhouse to serve nine months for violating the conspiracy laws. Five thousand petitions praying the pardon board to release the miners have been sent out. At the next meeting of the legislature, an effort will be made to have the conspiracy laws amended.

INDUSTRIAL PROJECTS.

The Crozier works, Roanoke, Va., will double the capacity of their furnace, which is now 110 tons a day.

It is stated that northern capitalists contemplate the erection of works at Birmingham, Ala., to make wire of basic steel, using the Reese patents.

A company was organized on the 4th inst. in Chattanooga, Tenn., with a paid up capital of \$200,000, to begin at once the erection of a 100-ton blast furnace in that city.

The Union powder company is establishing works at Granite, Lake county, Colo., for the manufacture of blasting-powder. The enterprise is supported by Leadville people. Only high explosives suitable for mine blasting will be made.

The Dickson manufacturing company, Scranton, Pa., has found it necessary to establish a separate plant for the exclusive manufacture of the Boies, formerly the Dickson, steel wheel. This is due to the increase of business in this line and in the locomotive department.

Governor Squire, of Washington territory, advocates the retention of the duty of 75 cents a ton on coal imported from abroad, as the operators in the territory are apprehensive that an effort to abolish the duty will be made by those interested in the mines of British Columbia.

Trade outlook is bright everywhere.

A FINE COLLIERY.

The New Woodward, at Wilkes-Barre, Promising to Lead all Others.

The greatest mine of the anthracite region will by the new Woodward colliery near Wilkes-Barre, Pa. It is being developed by the Delaware, Lackawanna and Western R. R. company, who have a tract of about eight hundred acres at that point. The main shaft was commenced in '81 and is the largest opening in the anthracite fields, being 12x55 feet in size. There are four hoisting ways, one pump way and an airway, the latter two being a portion of the southern division. The shaft is entirely timbered. As the surface is somewhat unstable a rock foundation was found necessary, and solid masonry four feet thick was recently put in to a depth of nearly eighty feet. The shaft was sunk to the Red Ash seam, which was cut at a depth of ten hundred and forty feet. In going down to this seam the sinkers cut through the same seams as are found in that vicinity, and in some instances the thickness was surprising. The array of coal in this shaft is pronounced the most extensive in the Wyoming region. The quantity of water in this opening is very great and will require three Knowles pumps to keep it clear. The air shaft is located about one hundred yards from the main opening. The shaft is 10x37 feet in size, has two hoisting ways and cuts the Red Ash seam at one thousand and three feet. This shaft is timbered, and now remains idle and full of water pending surface improvements. Two immense ventilating fans of about forty feet in diameter are to be constructed for these shafts. For the first hoisting ways of the main shaft first-motion engines of 24-inch cylinders and forty-eight-inch stroke are now being arranged, while those for the lower hoisting ways are direct acting with twenty-four-inch cylinders and sixty-inch stroke. The two conical drums are fourteen and sixteen feet in diameter. Engines of the same size as those of the main opening are being located at the air shaft. Over thirty cylindrical boilers will be required to furnish the power for the vast amount of machinery of the mine. The guides are now being inserted in the main shafts, and about three hundred and fifty feet of water still has to be pumped out, when the pump will be cut in the Red Ash seam. Lodgements will be cut for the Knowles pumps, three being required for each orifice. The immense trestling from the main shaft to the site of the breaker is nearly completed. It is nearly six hundred feet long and at one point is over one hundred and thirty feet high. The foundations for the immense double-winged breaker are being constructed and have the appearance of being natural terraces. The breaker, which is to be commenced at once, will be one foot wide, will consume 1,150,000 feet of lumber, and will have capacity will be three thousand tons per day. In order to furnish a foundation for the breaker a large creek was turned inland about seventy feet for quite a distance, at a great expense. The gangways of the mine will be opened up as soon a place can be arranged to stock the coal. The colliery will probably be in full working order within a year, and employment will be furnished about twelve hundred hands. The surface buildings are nearly all contracted for. The head house of the main shaft is one hundred and one feet high, and is just completed. W. H. Storrs and T. H. Carey are the superintendents at the mine.

Accidents in Coal Mines.

In an interesting paper on "Accidents in Anthracite Mines," read before the engineers' club of Philadelphia, Frank A. Hill stated that one of the greatest elements of danger in mining was the carelessness of the men. The most stringent rules seems to have no effect. The importation of unskilled foreign labor, he said, added greatly to the death rate, ignorance being added to carelessness. Roof-falls, explosions of fire-damp and careless handling of powder caused 60 per cent. of the accidents in mines. Ten per cent., he thought, was a high rate to place to the responsibility of officials. The record in Great Britain of loss of life for the past eleven years was one to 130,565 tons, compared with one to 102,697 tons mined in the anthracite region of Pennsylvania. While this seemed to favor Great Britain it was not, in reality, a true showing. In England no breakers are used, while in America the breakers wasted one-third of the material hoisted, so that the difference should be added in favor of America. As mining interests developed risks became greater, but improved methods kept pace with the increase, so that danger from accidents were becoming less instead of greater. The mine law of 1870 and the new law of '85, together with the earnest work of the state mine inspectors, had much to do with the reduction of the death rate. Mr. Hill thought there was still room for improvement, however, and hoped that the future would see still better methods in coal mining.

A prominent railroad official states that the harmonious relations which have existed between the Pennsylvania and Lehigh Valley railroad companies have become strained, and that the Lehigh Valley does not like the idea of the former coming into its anthracite coal territory, and will build the long talked of line from Ashland to Pittsburg to put the Pennsylvania upon its good behavior in the anthracite regions.

TRADE REVIEW.

THE COAL TRADE.

Throughout the anthracite coal fields the one ruling element is that of producing large quantities of coal. The collieries have experienced no abatement in the demand at all, which is so healthy and regular that there is no time for the works to remain idle for any great length of time, except in case of necessity through accidents to machinery. While the output is almost, if not quite, up to the allotment figures, it is satisfactory to know that it is all finding a ready market. Stocks on hand show no increase, but are light everywhere at the tidewater and other receiving points. Manufacturing fuel sales are reported steady, and bear a favorable comparison with those of previous years. As most of the staple industries of the state are now working with much regularity, especially the iron trade, it seems reasonable to expect that business will be steady for sometime to come. The weight of fuel reported as being consumed at the various iron works is very encouraging and there is every likelihood that forge coal sales will be of a more satisfactory character than has been the case for months past, as this branch of the iron trade is well off for orders and there is a probability of a good winter's work. Domestic sizes are in increased demand and most of the dealers are pressed to meet the present sales requirements made on them, and orders for future deliveries are said to be brisk.

In the matter of prices, the circular rates are little, if any, shaded. The talked-of advance in prices has not been made for this month and will not be. The coal managers met at New York last Saturday to discuss the matter, but took no action and adjourned until Nov. 30.

The most important item in this week's local history was the opening on Monday of the Schuylkill division of the Pennsylvania railroad for passenger and freight traffic between Pottsville and Philadelphia, which will be followed next Monday by the opening the Mahanoy Valley branch. The completion of this line opens a new and important channel of communication with the prosperous communities of the Schuylkill Valley, and at the same time furnishes a direct route to the great anthracite region of Schuylkill county. No branch of the great Pennsylvania railroad penetrates a section richer in manufacturing, mining and mineral interests than this, and the advantages of being placed in direct communication with a railway system of such far-reaching and wide-spreading connections, must bring inestimable benefits to all concerned. What the future effect of this competition with the Reading road may be no one can with certainty assume to say, but the present disposition of the managers of the two companies is for perfect unity. The Pennsylvania people are reticent on the subject, beyond saying that they expect to obtain a good patronage in freight and passenger business, while in coal traffic they look for a profitable tonnage of the fuel. It is the general impression in coal and railroad circles that the subjects of tonnage and tolls are under mutual consideration by the presidents of the two roads and that they will be arranged harmonically.

The bituminous coal operators met at Baltimore last week to form the coal pool talked of for some time past, and which was partly shaped last winter. No definite shape has yet been given the pool, though, those interested preferring to make haste slowly, so that future results may be certain. The trade is in its past normal condition, demand active but not paying the money that operators say is necessary to sufficiently compensate them for invested capital and time.

The total amount of anthracite coal sent to market for the week ending Nov. 6, as reported by the several carrying companies, was 719,853 tons, compared with 788,073 tons in the corresponding week last year, a decrease of 68,220 tons. The total amount of anthracite mined thus far this year is 27,113,404 tons, compared with 26,411,340 tons in the same period last year, an increase of 702,064 tons. The following statement gives the gross tonnage of each of the leading coal carrying companies for the week ending Nov. 6, and for the year to same date, compared with the respective amounts carried to the same date last year:

The coke trade is still suffering from the scarcity of cars for transportation, and the operators are emphatic in their complaints against the carrying companies. Quite a number of furnaces are idle because they cannot be supplied with coke, while those coke

operators who have the fuel at disposal are compelled to bank it through lack of shipment facilities. In explanation of this shortage the Pittsburgh *Manufacturer* says: "While there is a large number of cars built especially for the coke carrying trade and belonging to the coke producers, a large amount of coke is transported in box cars, return freight for these cars being secured in this way. With the great increase in the coke production of the Connellsville region, and especially the recent improvement at a time when the demand for cars in other industries has also increased, there is a shortage of cars for the coke business. It is also true that the 'hauls' of coke are longer than they were a few years since, when the chief production of Connellsville coke was in the western part of Pennsylvania, the eastern part of Ohio and the Pennsylvania handle region. This increased haul keeps the special coke cars longer away from the region, and consequently decreases the amount of coke they can transport out of the Connellsville district in a given time, in other words, practically reduces the number of coke cars."

	Week	1886	1885	Difference
Reading R. R.	277,391	12,072,130	11,540,275	531,855
Lehigh Valley	136,965	6,036,880	5,748,054	288,826
D. L. and Western	119,905	4,814,676	4,185,915	628,761
Shamokin	12,257	710,300	859,988	149,688
Del. and R. R. N. J.	31,224	1,432,622	1,484,367	51,745
Penna. Coal	38,355	1,265,152	1,197,001	67,851
Del. and Hudson	98,365	3,491,021	2,943,902	547,119
Pa. and N. Y.	42,076	1,729,289	1,526,156	203,133
Cleaveland Pa.	56,751	1,865,495	2,436,098	572,603
Hun and E. Top.	19,325	863,225	532,859	330,366
Nor. and Wtn.	16,946	723,071	496,113	226,958

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Nov. 6 was 321,190 tons, of which 235,406 tons were coal and 85,784 tons coke. Of this weekly tonnage 246,509 tons originated on the main line of the Pennsylvania railroad while the remainder originated on its branch lines. The total tonnage for the year thus far has been 12,731,128 tons, of which 9,784,574 tons were coal and 2,946,554 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending November 13, was 320,000 tons, of which 37,100 tons were sent to and 32,000 tons shipped from Port Richmond, and 27,000 tons were sent to and 28,000 tons shipped from Elizabethport. Vessels are reported in fair supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 90c. and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending Nov. 6 were 70,591 tons, and for the year to that date 2,108,615 tons, a decrease of 257,137 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—week, 54,781 tons; year, 1,646,083 tons; decrease, 49,288 tons. To Pennsylvania railroad—week, 4,261 tons; year, 215,989 tons; decrease, 137,788 tons. To the Chesapeake and Ohio canal—Week, 11,548 tons; year, 246,547 tons; decrease, 70,059 tons.

Chicago.

From the Industrial World.

The same conditions which have governed the coal market for the past two months have been repeated this week, only a greater pressure is being brought to bear on all parties handling eastern coal. Country merchants are getting more anxious about their winter supply, and are in constant communication with the Chicago dealers as to when shipments will be made, and the local agents in turn are continually remonstrating with the railroad authorities, and trying to compel the latter to fulfill their obligations and facilitate shipments. The railroads, however, are in very little better shape to forward coal than they were a month ago. There is, perhaps, a slight improvement in the receipts of egg coal, but it is too small to boast about. Dealers who are in shape to make sales other than to their regular customers have no trouble in realizing an advance of 25 to 50 cents over card rates for spot delivery. Receipts by lake are improving somewhat in spite of the high freight rates, which are now firm at \$1.25 from Buffalo.

The above conditions apply directly to the anthracite trade, and the agents here state that they are refusing orders continually, because of their inability to fill them. The movement of bituminous coal is constantly improving, and the same scarcity exists in this market with the eastern grades of soft coal as with anthracite. Prices are about steady at card rates.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.	
Per gross ton by carload, 2240 lbs	
Grate.....	\$ 15
Stove.....	6 15
Nut.....	6 45
Lehigh Lump.....	8 40
No. 4.....	6 75
Per net ton by carload,	
Grate.....	\$5 50
Stove.....	4 50
Nut.....	5 75
No. 4.....	6 00
Lehigh Lump.....	5 75
Lehigh Lump.....	7 00

BITUMINOUS.	
Erie & Briarhill.....	\$ 4 50
Pittsburg.....	3 50
Indiana Block.....	2 65
" Slack.....	1 25@1 35
Baltimore & Ohio.....	3 00
Hocking Valley.....	3 00
Youghiogheny.....	3 50
Wilmington.....	2 10
Blossburg.....	3 50
Cumberland Smithing.....	3 70
Sonman Smithing.....	3 50
Grape Creek.....	2 00
Fountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Minonk.....	2 00
Morris.....	2 00

CANNEL.	
Kanawha.....	5 00
Buckeye.....	4 35

COKE.	
Connellsville Coke.....	4 75@5 00
Charcoal, carload per bushel.....	4 75@5 00
	85%@88%

Pittsburg.
From the American Manufacturer.

The rivers are still too low to permit the sending out of loaded or the return of empty craft. Stocks in the river at Cincinnati and Louisville are about exhausted, and prices are a great deal higher. They are also higher at New Orleans. There is a good deal of coal loaded at the mines along the Monongahela river, and there is a prospect of shipping water by the end of the week. If it should come there will be a prompt relief in the lower markets.

We quote as follows:

PRICES AT PITTSBURG.	
River, wholesale, on board.....	4 @ 5 cts. per bushel.
Railroad.....	4 1/2 @ 5 cts. per bushel
AT CINCINNATI.	
River, wholesale, on board.....	10 1/2 @ 11 cts. per bushel.
AT LOUISVILLE.	
River, wholesale, board.....	10 1/2 @ 11 1/2 per bushel.
AT NEW ORLEANS.	
River, wholesale, on board.....	28@30 cts. per bbl.

Bushels are rated among dealers here at 75 lb.—23 bushels make a ton of 2000 lbs., approximately.

The barrel that rules the coal measurement in New Orleans contains 2 4/7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

In Connellsville coke there are no new features to note. Demand continues very heavy, and there is still a scarcity of cars. Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Nov. 13, 1886:

	Week.	Year.
	Tons.	Tons.
Shipped North.....	64,543-15	2,080,638 05
Shipped South.....	51,679-19	2,350,262 98
Total.....	116,223-14	4,430,900-13
By corresponding time last year.		
Shipped North.....	69,638-03	2,079,249 95
Shipped South.....	64,853-14	2,238,268 94
Total.....	134,491-17	4,317,507 09
Increase.....		113,393-04
Decrease.....	18,268-03	

Pennsylvania Coal Company Shipments.

Following is the report of shipment of Pittston coal for the week ending Nov. 13, 1886:

Shipped East to tide.....	20,574-18
" " Local points E. M. & Erie.....	4,119-17
" " West via L. S. & Erie.....	7,675-06
Total.....	32,670-01

Freight Rates.

The following are the current rates of freight on Anthracite coal from Port Richmond, as officially reported Nov. 15, 1886.

To Bangor.....	To Fall River.....
" Gardiner.....	" Providence.....
" Portland.....	" New York.....
" Saco.....	" Baltimore.....
" Portsmouth.....	" Washington.....
" Newburyport.....	" Norfolk.....
" Lynn.....	" Richmond.....
" Boston.....	" Charleston.....
" New Bedford.....	" Savannah.....

The annual settlement of the Philadelphia Mint shows that the weight of silver coin handled was \$41 net tons, and gold coin 13 tons.

LATE DISCOVERIES IN HONDURAS.

American Wealth Levelling Mahogany Forests and Re-opening Old Mines.

Hon. Floyd R. Wilson, an attorney of high standing in New York City, is registered at the Hotel Duquesne. He has but recently returned from Honduras and Central America where he has been looking after the affairs of a number of enterprises lately embarked in by Americans. He spoke enthusiastically yesterday to a *Dispatch* reporter of the kindness which he met in Honduras. He said that the influence of American capital is already to be observed in the country. A cart road has been completed from Port Lorenzo to Yucaran via Tegucigalpa, a distance of 125 miles. The road cost \$100,000. Of the treatment of foreigners in Honduras, Mr. Wilson said:

"I found the people ready, not only to listen to the advice of Americans, but to recommend their congress to pass special concessions granting extraordinary privileges in the way of extending mining claims, the obtaining and holding title in fee simple by foreign corporations, the exemption of supplies and machinery from duty and other matters. As a result, bills have been passed by congress granting most of these privileges. The liberal attitude of Honduras is very encouraging to the Americans who are working the old mines. There are now to be found in a day's journey hundreds of these abandoned gold and silver mines, which produced millions of bullion under the rule of the Spaniards before they were driven out of the country 1821. It is one of the privileges I know of a traveler to exaggerate, but when I say that millions of dollars came from these mines I speak advisedly.

"In the old days the Spanish government received 20 per cent. of the gross product of the mines. When I was in Tegucigalpa I saw the records of these receipts. I found that one mine, the Guayabillas, paid, from 1812 to 1817, \$400,000 in royalties to the crown. That means that the mine's gross product was \$2,000,000. And this was accomplished with the crude methods of mining known to the Spaniards."

F. R. Fast, who is a member of the Central American syndicate of New York, and is going west with Mr. Wilson, showed the reporter a number of extremely interesting photographs of the scenery in Honduras, among them being some admirable pictures of the ruins of Copan, which have never been seen in this country before. Speaking of these ruins, Mr. Fast said:

"They are situated not more than 100 miles from the north coast of Honduras, and at no great distance from the Guatemalan frontier. Surrounded by a growth of cedar and mahogany trees, forming part of a forest which is truly virgin, on a lofty plateau stand these wonderful remnants of the worship of a vanished race. There is no human habitation near them, and but few people take the trouble to wander among the pyramids and ruins of temples which cover a broad plateau.

But the recent results of excavations, which have been conducted at Copan under the superintendence of an American scientist, by name, I think, Warren, have proved the existence of archaeological treasures there. A hall 550 feet long, has been discovered which would appear to have been the principal chamber in an immense temple. Here huge stone images have been found, elaborately carved and inscribed evidently with some kind of hieroglyphics. What these hieroglyphics signify no one has yet determined. They are not decipherable by any known system.

"One of the odd things about these statues is that the faces of gods which they represent are in some cases distinctly Egyptian, and in others equally distinctly Mongolian in character. One of the stone faces might well have looked down from the doorway of Pharaoh's tomb, while not 20 feet away another face would just as appropriately ornament the walls of a temple in Peking. The question is how did the Egyptians or Chinese gods become known to the extinct race which once, undoubtedly, thrived and prospered in Honduras? Or did the Chinese and Egyptians actually colonize Honduras? Or was Honduras, as the central point of a continental empire which disappeared in some seismic convulsion, the place where the human race came into being?"

"The pyramids are smaller by far than those of Egypt, but still very curious, and monuments to the energy of a departed race. Every bit of stone was probably carried from a distance to form the mighty temple, and the finished character of the workmanship apparent even in the battered ruins, would indicate that the race which worshipped there was as wise as that which reared similar edifices upon the banks of the Nile, thousands of years ago.

"Now the ruins lie in the midst of a pathless forest, far from the habitation of man, and only in the race for the wealth which undoubtedly awaits the workers in the neighboring mines, has the attention of the world been called to them."

Mr. Garrison, of the Grand Union hotel, New York, states that in an experience of twenty-five years, as a landlord, he has never seen the city so filled with strangers as it is now. This, he says, is a sure indication of general business activity. Mr. Garrison keeps a first-class house, at reasonable rates, and we feel sure he gets a goodly share of the visitors.

IN A BURNING MINE.

How the Fire Was Beaten Back in the Standard Mine, Mt. Pleasant, Pa.

Splash! splash! I went the feet of the pit boss into the water. Splash!—Ugh! how crawly and dismal it is!—I followed, and then we stood and listened. The grass was still green in the fields and it was raining in a cheerless way—but that was 600 feet overhead, and what did it matter to us? Silence, dense and awful, all around us; darkness most profound and solemn, save where the dim rays of the safety lamp penetrated. Muddy water ahead, piles of slate and coal in the heading behind us. And there we stood and listened, or rather my companion listened and I stared around and wondered.

"It's middlin' deep ahead; go slow," said Dawson, the pit boss, and go slow I did. Up came the muddy, sulphurous water as we waded further and further into the pool, and as it crawled up to my waist it was warm and comfortable, in contrast to the cool dampness I had felt on my way hither. Presently the light stood still, and just in front of the half submerged figure of Dawson I saw a wall of beams and planking with cement thrust into the cracks.

"What's that?"

"The last bulkhead; we're within fifty feet of the fire."

"Then we can't go any further?"

"Oh, yes, a little further," and Dawson began to push at something I could not see. Up on the glistening coal of the roof of the heading and flitting on the walls, played the reflection of the danger lamp as it bobbed about while Dawson worked. Then there came a puff of warm air and a strong sulphury smell, accompanied by some ghostlike, thin clouds of smoke. A sliding door in the bulkhead had been pushed open and in a few seconds we clambered through it and were elbow to elbow with the fire. There was little to see at first. The coal had been worked out of the heading and only a thin coating of it remained on the roof and sides. Under foot was only twelve inches of water, for it was backed up against the bulkhead on the other side. Twenty feet we went and saw nothing but smoke, and then I saw a novel sight. In front of us and on the roof of the heading was a dim red streak. It rapidly grew brighter like some dim subterranean sunrise—if I may use so far fetched a simile—it spread across the black roof and down toward the edges. That was the slumbering giant; the chained monster, getting a breath of air from the hole in the bulkhead, through which we had come; and reviving from its lethargy into life and power again.

"There it is," said Dawson. "It doesn't amount to much there. There's only a skimming of coal for it to burn in and all the draft has been shut off. It's better than I expected," and he added hopefully: "We'll have her out by Monday or Tuesday all right," and then he turned back and I confess I was not sorry to follow him. The air was not hard to breathe in. Even to a novice like myself had no uncomfortable sensation except from the damp, earthy odor and the unusual smell of burning coal and rock. The Standard mine has always been free from fire-damp and gas, and the miners say the ventilation is much the best in the coke region, and even in the unusual conditions brought about by the fire it produced no other sensation than warmth and profuse perspiration. We had seen all that could be seen there at the foot of the old shaft where the fire began, and back we trudged into the headings near the slope where we had entered from outside. The pool of water we had encountered was water made by the mine and thrown in on the fire from a hose. The mine has not been flooded, nor will it be, as it is not necessary. Where the heading ran into the shaft level we found Reed, the fire boss, from whom we had taken a safety lamp as we entered. Our earlier explorations had been made with a naked light, but caution led us to change, as perhaps some gas engendered by the fire might lurk in the heading near the bulkhead. There was no gas there, however, or we would have felt its effects.

The men who placed these bulkheads felt the gas some days ago, however. It was evident if the air was not shut off the mine would be greatly damaged. It was not a time to ask men to expose themselves to the danger without going with them. General Manager Lyuch, as plucky a little man as ever lived, was on the spot, and he asked for volunteers to go with him. Five miners at once responded and down they went. Knowing the exact size of the heading, a bulkhead had been prepared and the party took it in with them. The heat was intense and the smoke blinding but the little band were full of nerve and determination. A mattress had been taken in for use at first and with this in their hands they made a rush to the edge of the fire line. They were almost overpowered but a moment's work sufficed to set the mattress on edge and in a couple of hours the draught was shut off and in a couple of hours the solid bulkhead was erected. Then came other dashes into the smoke in other headings and before many hours the fire was shut in. For a day new headings have been driven through the solid wall of coal, which are to connect the open headings and the footings of the slope with the openings at

the foot of the shaft where the fire is. Shifts of men work eight hours each day and night on these new headings and they are cutting in at the rate of a foot an hour. All the work of this kind will be done by Sunday and by Tuesday the mine is expected to be free from fire. The miners agree that the fire has done comparatively little damage to the mine and no danger exists from gas or from other sources except right at the fire.

Back we go into the darkness until the foot of the slope, 560 feet from the surface, is reached. We jump into the cars, a signal is given, and wire rope draws us up into the daylight. It was not a very cheerful sort of daylight, but after all I was not sorry to be in it again.—*Correspondent Pittsburgh Telegraph.*

The Strikes are a Success.

Among the most remarkable examples of modern success is the acknowledged success of the strikers. Labor is a king, enthroned and invulnerable, and whether he works or plays is a success. In Brooklyn, N. Y., strikes in the various building trades have succeeded in reducing the number of new buildings erected during the first half of this year to 1,878. In the corresponding half of last year the number of new buildings erected in Brooklyn were over 2000. This, however, does not show the full compass of the success of the strikers in those trades. They have succeeded in reducing the amount of employment offered in the building trades, during the indicated period to the value including material of about \$2,000,000 less than in the corresponding period of '85. So much for Brooklyn; what of Chicago? Why, in this wonderful, growing city, the strikers' success has been as great as in other cities, in the building trades even greater. They have succeeded in reducing the amount of employment offered in the building trades, this year, by more than \$1,000,000, and perhaps not less than \$500,000. In other words the Chicago strikers have succeeded in robbing themselves—they have deprived themselves of employment measured by that value less the cost of material in the building trades alone. In other trades, figures to show the degree of their success are not at hand; but there can be no doubt that the strikers in Chicago have succeeded in reducing the amount of employment offered in all the mechanical trades by as much as fifteen or twenty per cent. below the amount offered last year. Who dare say this is not a success, and that it is not a sure indication of what the strikers' societies will be able to accomplish when they get their arrangements perfected to achieve the full measure of the success of their enterprise? As is seen they have achieved much already, and they can, by simply ordering a strike of all the workshops, stop all activity of capital, and deprive themselves of the opportunity to get employment.—*Furniture Gazette.*

Arbitration in Massachusetts.

The Massachusetts state board of arbitration and conciliation has been called upon to act only twice since its establishment. In the first instance it immediately decided that there was nothing to arbitrate, as the parties calling for its services were out on strike, and therefore not the employees of any body. The second case occurred last week, the board being called upon by the employees of the Groveland woolen mills to arbitrate their grievances. The proprietor of the mills did not appear, and took no part in the proceedings, declining to present his side of the case. Nevertheless the board proceeded to act upon *ex-parte* evidence. It finds that there is no ground for the charge of cruelty to children, but it recommends that certain classes of employees be paid higher wages, on the ground that they did not receive the average pay in Massachusetts mills for the kind of work mentioned. The board has therefore, for once, fulfilled the purpose for which it was created. It now remains to be seen what will come of it. The *Boston Commercial Bulletin* remarks that if the board is to undertake the equalization of wages, without regard to the cost of living or the peculiarities of competition, its task will be simply stupendous, but it is feared its verdicts will not be effective. Lynn and Haverhill alone would occupy the time of the board for months in this equalizing process. Even then the work in that direction would not be complete, as something would have to be done towards equalizing the wages in the border towns of other states, where the Massachusetts board has no jurisdiction.—*Bangor Industrial Journal.*

There is a prospect of enforcing the U. S. law against the importation of laborers, passage paid under contract to work for the parties importing them. The law has been flagrantly violated, and when the commissioners of emigration at Castle Garden placed the facts, with ample proof, before the U. S. district attorney in New York he refused to prosecute. Some time ago forty-eight foreign laborers were imported contrary to law, and put to work in a mill in Rhode Island. The owners of the mill, however, do not seem to have been willing to carry out their contract with the laborers in the matter of wages. The laborers then took legal counsel to oblige the mill owners to carry out their contract. After the case was thus brought to publication the U. S. district attorney of Rhode Island felt obliged to take action and accordingly writs were to be served on the owners of the mills to recover the penalty of \$1,000 on each laborer imported. The writs are returnable Nov. 15.

Bituminous miners talk of a strike for wages.



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FOR THE WEEK ENDING

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BUSINESS PROSPECTS.

The developments of the past week in business circles have been chiefly of an encouraging nature. Among the influences tending to create a larger volume of trade and more widespread and substantial confidence are the termination of the Chicago strike, the change in the weather and a decided improvement in the money market. The volume of trade, although somewhat improved, is not quite up to expectations, but this is due, perhaps, rather more to expecting too much than to any diminution in the volume of business. Trade was unusually active up to a few weeks ago when retail merchants became well stocked and the demand for the timeslackened. The business being transacted at present is far in excess of that of any like period in a previous year; but there are those who evidently think that when the volume of trade begins to increase there should be no limit to it.

Advices from different parts of the country show that business is active and that merchants, manufacturers and traders are generally hopeful of a continuance. Low prices of products continue to encourage free exports, and the prosperity of business here is illustrated by the constantly increasing volume of imports. For the first two weeks of November the value of imports at New York in round numbers was nearly \$18,000,000, against \$14,000,000 for the corresponding weeks in '85, an increase of about 28 per cent. In addition to this gold continues to flow this way, owing to the continued purchase of American securities abroad, and money is abundant and made easier by the announcement that the treasury will prepay interest on other than called bonds. Speculation is active and confidence is being rapidly restored in all branches of trade and manufacture.

The unusual and unprecedented number of business failures occurring remain the single discouraging feature of the situation and the cause thereof remains a mystery. In nine out of eleven weeks, from August 27 to November 5, inclusive, have exceeded those in corresponding weeks in '85 by 269. On August 20 the total from January 1 was 6,528, or 1,010 less than in a like portion of '85. The succeeding weekly increases cut the year's decline down to 750 fewer failures than in '85. One week each in September and October showed increases of 45 against last year, leaving the next reduction in this year's failures, November 5, of 795, against '85. During last week there was a decline of 21 as compared with the second week in November last year, 206 against 227, showing 816 fewer failures this year than last to date. The decrease this year as compared with '84 is 544. Against '83 the increase this year is 295, and compared with '82, 2,614. While the decline in the number last week is about 9 per cent. as compared with the corresponding week of '85, it will be seen that the number is unprecedentedly large for a time of even comparative industrial and trade activity.

The iron and coal trades continue to be the most active branches of industry. The eastern pig iron market remains steady and very firm in price, but unchanged. The demand is good and furnaces are well supplied with orders, but the prospects of a "boom" are less conspicuous than a few weeks ago, and whatever hope there may be of such a thing in the east it has totally vanished in the west. The leading southern companies, which practically make prices for the western markets, are showing a disposition to repress "boom" tendencies, by making contracts for delivery through the whole of '87, and as a result the ten largest companies have the greater portion of their product for next year already sold. The demand from mills and foundries, while very satisfactory, has not enabled the trade to secure over \$1.50 to \$2 advance in their turn, which does not harmonize with the occasional reports of a "boom." The relatively moderate advance in the prices of pig and finished iron, and no advance at all in the price of steel rails within the past three months, have caused some surprise in the face of a very active demand, but this is readily explained on the ground of a wholesome dread of imports, Scotch, not to say English or southern pig, has a deterrent influence on the eastern maker, when considered as possible competitors. A moderate advance in eastern pig prices, however, is looked for soon, about \$1 per ton. Old rails are scarce and high, small lots having sold at Philadelphia lately at \$22.75. The tone of the trade generally is one of encouragement.

The anthracite coal trade continues active with production at the highest point and stocks at tide-

water shipping points diminishing. The producers are still pursuing their late policy in reference to prices, and are contenting themselves with letting well enough alone, and sending coal to market as fast as the somewhat limited transportation facilities will permit. It is not improbable, however, that a slight advance in price will be made about December 1 if the present demand continues, as it is likely to do. The production of anthracite from January 1 to November 13 was 27,812,750 tons, against 26,359,988 tons in a like portion of '85.

Bituminous coal is also in active demand at late prices. A meeting of miners and shippers of Bituminous was held at Baltimore last week to consider the proposition for the formation of a soft coal tonnage pool. Representatives from the Beech Creek, Clearfield, Cumberland, George's Creek and Pocahtons regions were present, but no definite agreement was reached. It is likely, however, that some sort of an understanding by which the trade will be more satisfactorily managed next year will be effected before the close of the year.

THE FUEL OF THE FUTURE.

It is a fact well known in manufacturing circles that the vast bulk of the heat contained in coal is wasted. Only fourteen out of the hundred parts of carbon is actually utilized. Hence, one of the problems of chemistry has been to get more power, in the way of heat and light, out of a given quantity of coal. Prof. T. S. C. Lowe claims to have solved this problem, a matter which is of vast importance, if it is a fact. The process is to pulverize the coal, and, in converting it into a gas, the coal is reduced to a powdered form so fine that it will float in the atmosphere, and it is carried into the burning furnace by a current of air artificially produced. In the powdered form everything is consumed, as it makes no smoke and leaves no ashes. This would utilize the mountains of so-called waste, now piled up near coal mines and manufactories. But Prof. Lowe's invention goes farther. The coal is converted into a water gas. A ton of anthracite coal will generate from eighty to a hundred cubic feet of gas. The cost will be about nine cents a cubic foot. This invention is already in use in the city of Troy, in the laundries of that place, and is also used for power and for heating and cooking in hotels and restaurants. The gas furnished is non-luminous and resembles that from alcohol. It has no odor and is intensely hot. These facts have come out in a report to the Scranton board of trade, which calls the new invention anthracite gas. The result will be a marvellous economy in the heating of houses and the cooking of food, while one ton of coal will go as far as a hundred of tons nowadays.

The king of the Belgians in his annual address to the parliament of that country, evinces a keen and wise appreciation of the fact that unless something is done for the betterment of the condition of his industrial subjects the figurative sword of Damocles may fall upon his crowned head. To stop the discontent which so lately found vent in riot and bloodshed his majesty announced that the government will propose to the chambers for approval measures to establish between the heads of manufacturing firms and workmen fresh bonds of union in the form of arbitration and conciliation councils; to regulate labor performed by women and children; to repress the abuse connected with the payment of wages; to facilitate the construction of dwellings for working men; to develop sick and provident institutions, pensions and life assurance; to combat the ravages of inebriety and immorality, and to check the adulteration of food. These be very fair promises, but politicians on the continent as well as here are prone to promise much in an hour of extremity and do little when the spur of their own necessities has passed. We shall hope for better things from King Leopold.

MANUFACTURERS who are relying on natural gas have important interests at stake. They are urging the present investigation into the permanency of the supply. Labor is also deeply interested in it. There are two schools—one which asserts that the gas will last forever, and one which says the gas will soon run out. The Murraysville gas fields is five miles long and a half mile wide, and it has 120 wells draining it, most of it going to the mills, shops and glass-houses and dwellings of Pittsburg. The Cherry Grove oil field, which had a daily production of 25,000 barrels in '82, made by 500 wells is now "doing" 300 barrels. They point to this to prove that the gas will run out. The vast investments in

industrial plants are jeopardized by the uncertainty of supply. Gasmaking systems have of late been attracting the studious attention of manufacturers in other localities, and schemes are now on foot looking to the adaptation of some of these systems to manufacturing requirements.

A discussion has been started over the relative merits of water-power and steam-power. The water-power advocates figure out that steam-power even in quantities—500 to 600 horse-power—cannot be created or maintained at a cost of less than \$50 per horse-power per annum, while water power will not ordinarily cost half that much. It is agreed that there are hundreds of places in the United States where valuable water-power can be conveniently utilized at little cost and confer important economic advantages on those who seek this but little used source of power.

THE P. S. V. RAILROAD.

Its Entrance Into the Schuylkill Anthracite Coal Field And What it Presages.

Today will mark a new era in the history of the anthracite coal trade. The Schuylkill division of the Pennsylvania railroad will be opened this morning from Philadelphia into Pottsville (94½ miles), the gate of entrance into the Schuylkill anthracite region, and through which connection will be made into other hard coal districts. Last week we announced that President Roberts and Vice President Thomas, of the Pennsylvania railroad, had held a conference with President and Receiver Corbin and Receiver Keim, of the Reading railroad, for the purpose of adjusting some long standing differences between their respective corporations.

This conference was had at the request of Mr. Corbin, who has entered fully and vigorously into an endeavor to finally settle the vexing web of Reading perplexities, and the result of his labors in this herculean task gives great promise of a speedy adjustment of the various entanglements of Reading affairs that may bring that valuable property into a paying condition before a very great while. The alacrity with which President Roberts responded to Mr. Corbin's request for a conference upon Reading grounds—the meeting being held at the office of Mr. Corbin—showed the willingness and desire of Mr. Roberts to meet the representatives of that corporation to adjust what has proved unprofitable to both companies—unnecessary and impolitic competition for business.

The Pennsylvania railroad is today the largest carrier of fuel on the continent. Its total tonnage of coal and coke for this year, to November 6, was 12,731,128 tons, an increase of 996,108 tons over the corresponding period of last year, notwithstanding that by the strikes in the Clearfield district this year over half a million tons were lost. These figures represent only the tonnage of coal and coke passing over the Pennsylvania railroad division of that company's lines. The new Pennsylvania Schuylkill Valley railroad, being now completed to Pottsville, that road will, of course, expect to obtain its share of not only the extensive coal traffic from the Schuylkill region, but of other classes of business as well. The new road will, of course, develop an entirely new traffic for itself in addition to what it may take from its neighbor in open, fair and friendly competition, and it was to have an understanding upon this matter that the chief executives of the two greatest railroads and largest coal carriers met next week.—*Phila. Ledger*, 15th.

A magnesite mine is being worked and opened on Cedar mountain, Alameda county, Cal. The magnesite lies in small seams, of more or less purity, in a high, steep bank or slide, broken with ridges of rocks. But little can be taken out, as every piece must be cleaned, by hands, before being sacked. From 200 to 300 pounds per day per man is good average work. It is sorted, according to purity, in three qualities. The sacks weigh from 80 to 100 pounds, the regular 100-pound flour sack being used. It is very difficult to predict the extent of the deposit. It may prove extensive, or may "pinch out" at any time. There are nine of these magnesite slides on the claim, but very few of them contain good seams.

C. J. Dobbins, of Pottsville, Pa., land agent for the Northernland coal company, has fifteen men employed in shafting on the Big Mountain, north of Mt. Carmel. Mr. Dobbins intends to make a thorough test of all the seams on the Northernland coal company tract, and if the deposits develop as expected, next year will witness the erection of one or more breakers there. Messrs. Taylor and Floyd, of Mt. Carmel, and Frank Leisenring, of Bear Gap, have now in successful operation on the tract two little mines with which they supply the domestic trade. Should the new breakers be erected, a railroad will be constructed from the Lehigh branch at the Red Tavern, near Centuria.

The traffic over the Lehigh Valley railroad is reported to be greater than ever before known. The average business over the main line during October was said to be 41 coal, 32 freight and 30 passenger trains per day.

CULM GAS.

The Great Possibilities of a New Fuel—Benefits to Coal Consumers.

The Mauch Chunk *Democrat* of Saturday last has the following:

"If the Wilkes-Barre *Leader* is not mistaken, we have here in the anthracite region fuel advantages quite equal if not superior to those of the natural gas region in western Pennsylvania. If so, in the nature of things, this will and must be demonstrated before long. This is what the *Leader* says:

The Distons, a great Philadelphia manufacturing firm, are reported about to move their works to within a few miles of Pittsburg. A New Jersey steel firm is also said to be negotiating for a place in the same vicinity. The attraction in both cases is the low price of fuel, the difference between the cost of natural gas near Pittsburg and that of anthracite coal in Philadelphia and New Jersey being more than enough to cover the present profits of these firms. Perhaps they have not heard that we can make in this anthracite region from otherwise useless culm banks a fuel gas which would cost even less than the Pittsburg natural gas, and that there is culm enough already in sight to make more of it than the geologist say there is natural gas in the western Pennsylvania deposits. The fact, however, is important enough to make it advisable both for us and for everybody, that it be widely known.

It is beyond question that anthracite, like bituminous, contains the gas, or, in other words, that it is mainly gas. Were it not so it would not be the valuable fuel that it is. Heretofore it was supposed that the gas could only be profitably drawn from bituminous, and not from anthracite. If this point is settled, that there is now a process by which the gas can be taken from anthracite, the same as from bituminous, then it is also certain that culm will yield the gas as stated by the *Leader*. The only difference between culm and anthracite coal, as the latter finds its way to market, is that culm is from fifty to seventy-five per cent. pure anthracite dust and the remainder particles of slate and dirt.

And the *Leader* is certainly correct in regard to the quantity of culm throughout this region. We have some hundreds of millions of tons right here in the vicinity, and as the mining of coal continues, the culm mountains keep growing in proportion.

It would indeed be strange in this age of progress and science if a way could not be found to utilize this immense amount of valuable fuel for manufacturing and other purposes. It is, therefore, only a question of time when it will be demonstrated that the culm of the anthracite region is quite as valuable as, and at the same time much safer and under more perfect control than the natural gas in the vicinity of Pittsburg, which may or may not be inexhaustible.

It seems to us another very important advantage must be assured if culm gas shall prove as successful as claimed by the *Leader*. A large percentage of the labor in the anthracite production is to separate the slate from pure coals so as to assure the least possible waste. If the culm, by reason of its capacity to furnish an abundance of gas, fuel thereby becomes almost as valuable as coal itself, less pains will be taken to separate the culm from the pure coal. Pickers will be directed to pass all particles of doubtful purity to the culm pile, and thus the coal going to market will be yet cleaner and purer, and consequently more valuable to the consumer, thus benefiting all concerned, the producer as well as the consumer.

And even if the *Leader* is mistaken in saying that "we can make in this anthracite region from otherwise useless banks a fuel gas which would cost even less than the Pittsburg natural gas," or if this is only a prediction, it must become true in the nature of things. The culm is here, in almost unlimited quantities, and it is probably from fifty to seventy-five per cent. pure anthracite. That a way will be found, if it is not already found, to utilize these immense culm banks, and wonderfully add to the importance of the great anthracite region may be put down as an absolute certainty, and that, too, in the near future.

The Philadelphia *Record* says: A New York gas company now obtains a yield of 50,000 cubic feet of a diluent gas from one ton of anthracite coal.

MINE ACCIDENTS.

Peter Graham, a laborer in the Hartford mine, Ashley, Luzerne county, Pa., was instantly killed on the 15th, by a fall of top rock.

Edward Richards, a miner employed near Tombstone, Arizona, was blown to pieces recently by the explosion of two giant powder cartridges.

On the 15th Thomas Jones, a door tender in No. 1 slope, Drifton, Pa., Luzerne county, Pa., had his head caught between two mine cars and squeezed in a manner to cause death instantly.

FROM and after the date of this paper the MINING HERALD withdraws its offer of the "Miner's Slope Level" as a premium for subscriptions. We shall shortly substitute something equally desirable.

In addition to copper, iron and gold, the Lake Superior region has proved to be the possessor of a very rich vein of nickel.

COAL DEVELOPMENTS.

The Pardees, Lehigh Valley operators, are buying up coal lands in West Virginia.

South Laurel Ridge colliery, at Mahanoy Plane, Pa., is shipping about twenty cars per day.

New Lincoln colliery, at Tremont, Pa., will soon increase the shipping capacity to about 150 to 200 tons daily.

The river coal operators at Pittsburg, Pa., talk of forming a pool like the coke syndicate, and buying the coal mined by small operators.

North Ashland colliery, at Ashland, Pa., has increased its shipments to a hundred and twenty-five cars per day. Last colliery will not resume operations until about December 1st.

Considerable excitement is awakened at Rochelle, Ill., over the expected find of a vein of copper ore on a neighboring farm. An old miner estimates that a vein of copper seventeen to nineteen inches thick will be found.

Shoe Fly colliery, near New Philadelphia, Schuylkill county, Pa., operated by the Alliance coal company, has suspended operations, owing to some difference between the companies interested in the land and the colliery.

Lee and Patterson, coal operators, who own mines at Clinton, Lawrence county, Pa., have leased the old coke oven plant, which contains eighty ovens, and will put them in full operation as soon as necessary repairs can be made.

The breaker at Silverbrook, Pa., is complete and in a few days the operators, Messrs. Wentz and Leisenring, expect to have it in full operation. This breaker is one of the finest as well as the largest in that region, requiring nearly a million feet of lumber in its construction.

The people of the Chester valley, Pa., are excited over some well-founded rumors of gold discoveries in their immediate vicinity. Two experts examined the specimens and gave it as their opinion that it would yield \$26 to the ton of ore. The residents are anxiously awaiting further development.

LABOR TOPICS.

The miners at Evansville, Indiana, went out on the eleventh, on account of a refusal to pay every fortnight.

Eight hundred coal miners at the Erie, Marshall, Fox and Louisville mines, in Colorado, on the 10th, quit work because of reduction in wages from \$1.12½ to \$1 per ton.

Charles Kehler, whose son Daniel lost an arm at Schwenk, Robertson and company's colliery, in the Centuria, Pa., region a number of years ago, was awarded \$500 at court last week for the loss of services.

The Thomasiron company has, according to the statement of one authorized to speak, decided that it will make an advance, after the first of the year, of \$1 per ton over the current prices for its best grades of iron.

For the first time in several years there is no strike of any consequence in Pittsburg or the surrounding district. Every furnace, iron mill, and factory is in full operation, and if the coal mines are not running, it is for want of water, not for orders. Labor leaders claim that there is a larger proportion of the workmen of Pittsburg employed at the present time than in any other city in the union.

A call has been issued for a convention of delegates from all the trades unions in the United States and Canada, to open in Columbus, Ohio, on the 8th prox. One of the principal objects of the convention is the formation of "an American federation of all national and international trades unions to aid and assist each other and to secure legislation in the interest of the working people and influence public opinion by peaceful and legal methods in favor of organized labor." Chris Evans, secretary of the miners' federation to which the M. & L. A. A. is attached, is one of the signers of the call.

A despatch from Pittsburg states that President Costello, of the miners' amalgamated association, left for the Connellsville coke region to use his influence in averting a quarrel between the operators and the men. A demand has been formulated by the local executive board of the association and presented to the coke syndicate. If this demand should be denied the men threaten to strike, but the chances are against a lockout. Such action would be particularly severe upon the producers just at present, as the demand for coke at paying figures is greater than the product.

Charles A. Ashburner has resigned his position as geologist in charge of the state geological survey for the purpose of associating himself with George Westinghouse, Jr., of Pittsburg, for the purpose of promoting the organization of heat, light and power companies in the United States, and also with the view of the location and development of natural gas fields. A contract has been made between the geological survey and Mr. Ashburner, by which it is agreed he shall temporarily give one-half of his time to the survey in order to permit him to complete the work which he has at present in hand.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith. The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

Wants a Certificated Boss.

Editor Mining Herald and Colliery Engineer:

SIR:—For the health and safety of persons employed in coal mines, the fifteenth section of the mining law says there must be a certificated mine boss (either legal or servitud) to act as inside overseer. We have a man here in the third district holds neither, and they defy the mining laws of Pennsylvania, and they say they will run without a certificated mine boss. I heard of the inspector being there a few weeks ago, but he paid no attention to it. Thomas K. Adams is a very fine and kind-hearted gentleman, I know, but in justice to the mining laws of the state and the safety of the miners, and in justice to other bosses he ought not to allow this thing to go on. This same man has tried twice to make the examinations, but could not answer one question, and Mr. Adams knows it. I don't think we are doing justice to the mining public to let this thing go on. Hoping Mr. Adams will see to it, I remain a miner for the rights of miners.

Yours, &c.,

T. M.

Hilliard, Pa., Nov. 7, '86.

Deepest Shafts.

Editor Mining Herald and Colliery Engineer:

SIR:—I would feel obliged to any of your readers if they would kindly let me know where a few of the deepest shafts are to be found—both on the continent and also in Britain—with their respective depths.

Yours truly,

A MINER.

Houtzdale, Pa., Nov. 15, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—A few years ago I had under my charge fifty miners, each one of them was supplied with 250 cubic feet of air per minute, which was driven through an air course 5 ft. by 5 ft. and 2,000 ft. long, but now, since the workings have been extended, this air course has been driven 6,000 ft. further, there are now ninety miners employed in the pit, but I find the ventilation very defective, having only a supply of 6,250 cubic feet per minute. I wish to increase the ventilation again, so as to give each miner 250 cubic feet per minute. What size will I require to make this air course to produce the said amount of ventilation for each miner, the ventilating power remaining the same?

Perhaps some of our colliery managers will be kind enough to help me out of this difficulty.

Yours, &c.,

YOUNG COLLIERY MANAGER.

Dunmore, Pa., Nov. 10, '86.

Arithmetical Questions.

Editor Mining Herald and Colliery Engineer:

SIR:—I should be much obliged if in your next issue any of your correspondents would give me the solution in detail of the two questions worked by logarithms:

What is the 2-19 power of $\frac{1}{2}$?

What is the 2-19 root of $\frac{1}{2}$?

Yours, &c.,

M. E.

Savannah, Ga., Nov. 7, '86.

Colliery Management.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any of your correspondents answer the following questions?

1. What age must a candidate be before he can be examined for a certificated colliery manager?
2. At what scales are colliery plans made?
3. Is there any limit to the temperature of an up-cast shaft where a ventilating furnace is used?

Yours truly,

DEPUTY.

Scranton, Pa., Nov. 7, '86.

Air and Water Pressure.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any of your readers answer the following, or show a student how to work them out?

1. The quantity of air which is intended to flow in a new mine is 116,640 cubic feet per minute. What

size ought the shaft be to have a mean velocity in the shaft of 7½ ft. per second?

2. Give the correct rule for finding the pressure of water in pipes. I have seen the following: which of them is generally adopted? Head of water in inches $\times .03617$ = pressure in pounds per sq. in. head of water in feet $\times .433$ = pressure in pounds per sq. in.: head of water in feet

$$\times \frac{62.5}{144} = \text{pressure}$$

in pounds per sq. in.

3. Give the rule for calculating the thickness of pipes necessary for heads of water equal to 300 ft. and 800 yards.

4. Enumerate the advantages claimed for the application of compressed air to an engine placed underground.

Yours respectfully,

STUDENT.

Chillicothe, Ohio, Nov. 4, '86.

Arithmetical Query.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you kindly insert the following question in your next issue, hoping some of your correspondents will kindly help me out?

A rule to find the number of terms when one extreme, common difference and sum of the series only are given? As per question 199 in Alfred J. G. Swinney's "Hand Book to the Examinations for Colliery Managers' Certificates of Competency." A winding engine draws coal from a pit 150 fathoms deep, drum 14 ft. diameter at lift, flat ropes ¾ in. thick, find the meetings of cages?

Yours, &c.,

J. A. C.

Pittston, Pa., Nov. 13, '86.

Engineering.

Editor Mining Herald and Colliery Engineer:

We have a pair of double-acting donkey engines, cylinders 1 ft. diameter, 16 in. stroke, thirty strokes per minute, wishing to know the nominal horse power. Again, how many gallons of water will such an engine throw from a depth of 100 yards? Diameter of pumps 8 in., and two rams 8 in. diameter, boiler pressure 50 lb. Answers to the above will greatly oblige,

Yours, &c.,

STUDENT.

Minersville, Pa., Nov. 15, '86.

Pumping.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you kindly insert the following in your next impression? The following is the rule by which the horse power of engine is calculated:

Multiply the area of the piston in square inches by the average effective pressure in pounds per square inch on the piston, and the product by the speed of the piston in feet per minute, the result divided by 33,000 will give the horse power. The horse power of engine with a cylinder 24 in. diameter, stroke 4 ft., average effective pressure on the piston 20 lb. per square inch, and making thirty-five revolutions per minute, is neglecting fractions, 77. The next work to be done by the engine is equivalent to 41 horse power, leaving 26 horse power to overcome friction.

Yours, &c.,

WEATHERILT.

Shenandoah, Pa., Nov. 19, '86.

Value of Mines.

The test of merit of a mine is its ability to yield a profit, when properly worked. The test of merit of a prospect is its ability to become a paying mine when developed. Naturally, it is much more difficult to determine the value of a prospect than to determine the value of a mine. Still, there are rules which experience has taught are safe to follow, in estimating the chances for a prospect becoming a paying mine. The rules are altogether different in judging a fissure vein prospect from those which are, or should be, followed in judging a contact or bed deposit. The value of the latter depends largely upon development of surrounding claims, value of ore, size and direction, which are commonly accepted. What we commonly call a fissure vein gets no value from its proximity to rich veins. Each vein is a "tub that stands upon its own bottom." An enormous amount of labor is expended in working assessments on and developing veins which give not the least promise of ever becoming paying mines. It is impossible to generalize rules for judging prospects which are without exceptions, but experience has taught a few which can always be followed with safety, and from which no experienced miner will deviate. The first rule is, that if it is not found on the surface, it is useless to dig for it. There never was a greater error than the commonly accepted opinion among prospectors that veins increase in richness as depth is gained, and that all that is required to make a mine is to sink to considerable depth. The instances in which richer ore is found at depth than on the surface are very rare. After shinning up and down a great many hundred prospect holes, and from the British possessions to the Caribbean sea, we can say that we have never seen a paying mine which did not have pay ore on the surface. The cases, too, are very rare in which the quantity of ore increased with depth. If, after prospecting the surface of a vein, pay ore is not found, it is a

poor investment to continue work upon it. The fissure vein prospect which has value is the one which discloses ore of sufficient richness and in sufficient quantity to make a paying mine if it continues until the vein is developed to the point of economical production. The exceptional prospect, with exceptional value, is the one which is rich enough to pay for its own development. Of course there are other things besides those to be considered in determining values. The cost of working a vein, the character of the ore, the location, with reference to wood, water, roads and markets, are all important factors in determining values. There is one thing that can be set down as a certainty, which is, that prospectors almost invariably place a value on their claim far in excess of any value they can possibly possess. Nine-tenths of the prospects in the country, judged by the rule here laid down, would be dear at the price of recording a deed. The sooner prospectors learn these things, the better will be their chances of finding something salable and valuable.—*Denver Republican.*

The Life of a Miner.

It is seldom that so true a picture is found as is presented by the following from the *Eureka Sentinel*: "To those who know nothing more of mining than they gather from seeing ore hauled to mills and there witnessing the process, it must necessarily pass through in order to obtain the precious contents, the miner's calling does not seem to be one that requires a high or even more than a commonplace order of intelligence; but this is a mistake. The perils that environ a miner at his daily tasks, and that are sometimes so subtle in their natures as to require nothing less than a scientific mind to combat them successfully, make it necessary and highly important that, so far as the work of mining is concerned, only men of skill, of clear heads and steady nerves and a fair knowledge of the work, should be engaged in it. There are some people who cannot realize a distinction between the miner and laborer. The former, in order to fulfill the requirements of his calling, must possess considerable skill and knowledge of the intricate work of drilling and blasting down the tons of rock and ore from their fastnesses of centuries, while muscle and endurance are sufficient for the latter. A knowledge, too, of timbering, lagging, etc., is imperative necessary. This scribe can never meet one of these grim stained men passing down Poverty Gulch or over mountain trails on his way home laden with heavy footsacks and a goodly store, without feeling something of the thrill of happiness that he knows must greet him as he enters his little home where he left anxiety to take his place when he set out for his day's risk and toil. From the time the miner sets his foot on the cage that whirls him down in 'hell of the deep sunk mines' until he emerges again from his work, the specter Death is his constant companion, and his friends above ground do not know what moment they may hear the terrible news of his being crushed by a fall of rock or torn to fragments by one of those unexpected blasts, whose destructive powers no pen can adequately portray. There is a poem in the life of a miner which awaits the touch of some inspired writer who will give it adequate expression."

Railroad Growth.

In spite of the dull times for business during the last three years, the mileage of new railways laid during the present year will surpass that of any previous year in the country's history save '81 and '82. The *Railway Age*, which has kept the record of advancement in this kind of enterprise, predicted in July last that the total new railway mileage of '86 would not fall short of 6,000 miles, and in the issue for November it says: During the four months which have elapsed since that statement was made over 3,600 miles of main line tracks have been added to that already laid in the present year. The preliminary work of grading and bridge building which had been in progress during the first part of the year, in almost every state in the union, has now been supplemented by a large amount of tracklaying. The weather throughout the country has been unusually favorable for construction, and the improvement in general business has encouraged railway extension. Tracklaying has been in progress this year in thirty-nine out of the forty-seven states and territories on 216 lines, and no less than 5,439 miles of new main track, not counting sidings and additional tracks, have been added to the railway system of the United States since January 1. Remember that the total new mileage of '85 was only 3,131 miles, and that of '84 only 3,825 miles, the record for the first ten months of the present year will be seen to indicate an astonishing increase of activity. A large additional mileage will be laid for the track before the end of the year. We are now certain that the new railway mileage of '86 will prove to be not less than 7000 miles, while if the weather continues favorable it may considerably exceed that figure." The activity thus far has been confined chiefly to the northwestern and Missouri river states, but the railway enterprises which are projected now in the south make the outlook for '87 exceptionally bright.

The Grand Union hotel, New York city, has published a useful little memorandum book which will be mailed to any address on receipt of 2c stamp.

Address, "Advertising Department,"

GRAND UNION HOTEL,
New York City.

SPONTANEOUS COMBUSTION.

Some of the Causes That Lead to It and How to Remedy Them.

Alfred Bache, of the English institution of civil engineers, writing on the subject of spontaneous combustion in collieries, says "oxidation of the hydro-carbons on exposure to air cannot develop heat enough to ignite the coal; and the only way in which he can account for spontaneous combustion in such coals is by the presence of dust or fine slack in the midst of any heaps that are found to be heating. Dust and fine slack he considers capable of exerting a coneburning power upon the combustible gases that are ready to escape from bituminous or gaseous coal, and also upon the oxygen of the air; and the heat so developed may become sufficient to fire the gas, and thereby the coal. While therefore spontaneous combustion may occur in any colliery, whether the coal contains pyrites or not, it is more particularly in seams of coking coal, containing pyrites, that, as the workings progress, the pillars left standing grow not rapidly, under the combined action of oxidation of pyrites, pressure and subsidence of roof, and oxidation of hydro-carbons through condensing power of dust. It is the pyrites, however, which, wherever present in any appreciable quantity, plays the principal part in starting ignition, and thus constitutes the primary cause of fire; the other causes are then but secondary, although they may so far supplement the start thus given as to make a seam containing but little pyrites appear readier to fire than one containing much more." The development of spontaneous combustion is considered firstly in the case of masses of coal; such as pillars left in working. Really solid pillars never fire, those that do are always fissured with numerous cracks and are more or less crushed. Outbreaks of fire are encouraged by the presence of any coal crushed small, which, in its finely subdivided state promotes the chemical actions that induce heating. Fire first smoulders at the bottom of the innumerable cracks by which the pillars have become fissured under the crushing load they have to support. Then the walls of the cracks get red-hot and burn, sometimes bursting suddenly into flame where the previous heating has covered them with bituminous matter. The tarry smell thus occasioned often betrays the existence of fire before it has become visible; and so difficult is it to find its actual seat, that often it is not discovered until it has crept outwards toward the air current at the mouth of the chinks, and has ignited the crushed coal behind the timbering of the roads and then the timbering itself. The danger is augmented wherever there are timbered excavations overhead, and still more wherever a timbered drift has been pushed forward under a mass of crushed coal overhead. Through such a mass air circulates easily, heat and moisture collect there, and fire breaks out quicker than where the overhead coal has been got out previously. Wherever crushed coal can be harbored on or amongst the rubbish that is packed into the goaf, fire is sure, sooner or later, to break out. It begins at some distance in from the roads and creeps out gradually towards them, igniting on the way any timber that may have been left buried in the gob-packing; the pungent wood smoke gives immediate warning of the fire. Pillars purposely left unworked, either for maintaining a shaft or because the coal in them is not so good, are also liable to start a fire. The load bears unevenly around them, they crush and crack under it, and small crushed coal accumulates next to the gob-packing; the heavier the pressure the sooner do the pillars heat and fire danger arises, or by the introduction of a lamp so shielded or otherwise arranged as to make it impervious to draught, and thus to nullify any velocity of current. Practical miners would not be likely to adopt the former, for they were well aware that with slow sluggish currents in a seam which gave off fire-damp freely it was impossible to keep the general atmosphere of the mine comparatively pure, that is, clear of what is technically termed a "cap on the lamp," or so to ventilate the broken parts of the roof as to keep them clear of explosive gas. With sluggish currents in a fiery mine, its no prudent manager would tolerate; under such a condition of things, any local explosion of fire-damp, which, under more favorable circumstances might have been harmless, would by reason the dust and heat set up, extend itself throughout the colliery. If this view were correct they would fall back upon an improved lamp. There were some important conditions it must fulfill, the most imperative of these being:—(1.) That it must be self extinguishing in an explosive mixture. (2.) That it must be impervious to draught. (3.) That if glass is used in its construction it must be so arranged that the light will be extinguished before it can impinge on the glass when canted sideways. (4.) That it must be strong and simple in construction. Now, in the absence of any novelty solving once and for all this difficult question of safe lighting, they were left to select the lamp that fulfills the conditions enumerated the nearest, and in the

writer's opinion that lamp was the Mueseler; it satisfied the first three conditions entirely, but the fourth it did not meet, and anyone who could simplify its construction and reduce the number of parts going to make up the lamp would confer a great boon on the mining community. During the last few years a startling danger in connection with blasting had been constantly pointed out, viz., that a shot blowing out into an atmosphere partially charged with fire-damp, but still much below what had hitherto been considered the explosive point, would, on account of the dust particles being cast in the mixture by the blast and the large body of flame emitted, cause a serious and fatal explosion. In other words, that an atmosphere containing something like 2 per cent. of fire-damp was rendered explosive by the simple addition of a little dust, such as is always to be found in large quantities on the floors of deep dry seams. Mr. Hall on this point quotes from a report of the royal commissioners, whose experiments had shown that in air travelling at a velocity of 800 feet per minute different coaldusts suspended in the air, containing from 2 to 2.75 per cent. of fire-damp, produced explosions. At a velocity of 100 feet per minute the same result was obtained with air containing only 15 per cent. of gas; and ignition of dust approaching explosion and extending to considerable distances, were obtained with dust in air containing much smaller proportions of gas. Mixtures of fire-damp and air bordering on those which would ignite on the approach of flame, were instantaneously inflamed by lamp when they contained only a few particles of dust in suspension, and it was found that these need not be combustible, but that some perfectly non-combustible dusts possessed the property of bringing about the ignition of mixtures of air and gas by a lamp flame which were otherwise not inflammable. It seemed impossible to believe that shots were not often fired in an atmosphere containing 2 per cent. of fire-damp, invisible to the lamp test—as, for instance, in leading places where long lengths of brattice have to be used, and where there is sure to be considerable emission of gas and always plenty of fine dry coaldust. How was it, then, that in such places and under such circumstances explosions did not frequently result? Of course, if the shot did its work properly, and cast out little or no flame, an explosion would not be expected, but the writer had always been given to understand that "blown out shots" were by no means uncommon in such places, and in all such cases an explosion might fairly be expected. Experiments made to find the extent of the exhaustive power of blown out shots, gave the following results: A number of charges of gunpowder (1 lb. per charge) were fired from a small cannon attached to the inside of the end of a boiler 36 feet long and 6 feet 6 inches diameter, representing a tunnel or working-place underground, and on a Richard's vacuum indicator being connected, it was found that a partial vacuum was set up at each shot, and this not only at the end of the boiler, but also along its sides, the decrease of pressure amounting to 3 lb. on the square inch. A strong tin tube 3 inch diameter and 6 feet long was also fixed with its open end entered into the boiler a few inches above the position of the cannon, the other end of this tube being closed and projecting outside the boiler, and on the first shot being fired the tube collapsed, proving that the air had been almost entirely sucked out of it. Now, the action of a blown out shot must be almost precisely similar to that of the cannon, and the face of the coal where it has been planted must be subject to a great exhaustive force, and this would be followed in a fiery seam by an outpour of fire-damp. There appeared to be a strong case for further restrictions as to the use of gunpowder, and they no doubt have suggestions in this direction from the commissions, which might assume something like the following:—(1.) That the use of explosives cannot be dispensed with altogether. (2.) That the adoption of the long-wall system of working will most nearly render the use of explosives unnecessary for getting the coal itself. (3.) That blasting under its most favorable aspect is attended with substantial danger, but when the charge blows out, as it not infrequently does, then there is imminent risk of a serious explosion, if the mine be fiery. (4.) That as far as possible blasting should be altogether dispensed with, but in no case should it proceed in mines subject to fire-damp whilst a large number of persons are underground.

M. Leon Esquille has found it possible to employ photography and electricity together for the purpose of recording and reproducing speech in a more direct manner than has hitherto been done. M. Esquille's method consists in speaking in the first instance to the photophone transmitter. The readers will remember that this is merely a diaphragm with a highly polished surface from which a ray of light is reflected. The record of this speech is then obtained by simply photographing the ray of light upon a traveling band of sensitized paper. After having been developed, the articulation may be reproduced by projecting the image of the trace by means of an electric arc or oxyhydrogen light upon a selenium receiver, preferably one of the form due to M. Mercadier. The speech is then heard through the telephone in the usual manner. It seems highly probable that, although this method is certainly more troublesome, it will give results superior to those of instruments which, like Edison's phonograph and Professor Bell's more recent "graphophone," depend initially upon an electrically formed trace of the sound vibrations.—*Electrician*.

Lee & Patterson are putting up seventy-five coke ovens at New Castle.

MINE ACCIDENTS.

James Ryan, 21 years old, was instantly killed at Shamokin, Pa., on the 9th, by falling down the Big Mountain slope.

William Murray was killed by a fall of coal at Knickerbocker colliery, Shenandoah, Pa., on the 9th.

The mine accidents in the Scranton district during the month of October numbered forty-seven, of which ten were fatal.

Michael Brennan, aged 50 years, of Centralia, Pa., was fatally crushed by a fall of coal while starting a battery at North Ashland colliery, on the 11th.

Long Working Hours Abroad.

The reports of the inspectors of factories which have just been issued in Berlin show that the employees in most of the German factories work eleven hours daily, not reckoning overtime. With overtime the workmen in some districts, notably Dusseldorf, work from thirty-six to forty-eight hours at a stretch, though they are supposed to have liberty to quit after twenty-four working hours. The usual hours of a boiler-man in Dusseldorf are twelve and often twenty-four hours. In Magdeburg artisans work twelve hours, in Hanover ten and in Amsburg eleven. The steelware and iron apprentices in Dusseldorf often work sixteen hours daily. In the fourth glass works the men work six days unceasingly, except for two hours, when they sleep in corners of the workshop. The general impression from the reports is that there is much overwork and a bad arrangement of hours, with a hideous sanitary condition.

Coke Operators and the Car Famine.

"What difference does it make what the price of coke is if we cannot get it to market?" exclaimed a coke operator on the 13th at Everson, Pa. "Here are furnaces banking up because of a shortage in coke, and yet coke is being piled up at the works in this region because we cannot get cars to carry it away." That is about the size of the situation in the coke regions. If it were not for the twenty-five hundred individuals cars belonging to coke operators the car famine would be most disastrous in its effects. So short of cars is one of the roads that it only furnished one car for the Cleveland trade last month, although the demands of that trade amount to seventy cars a day. The other roads had to make up the difference. The large users of coke in the west have sent special agents to the coke region to look after their shipments.

The largest amount of money ever distributed in a single day in the Mahanoy valley, Schuylkill county, Pa., was paid to the miners of that district on Saturday, the 14th. The Philadelphia and Reading coal and iron company paid out in the neighborhood of \$100,000; the Lehigh Valley coal company about \$50,000, and the individual operators about \$25,000, making a total of \$175,000. The miners and business men were happy, not only because of the large amount of money distributed, but also because for the first time in twelve years an advance of one per cent. was paid. This amounts to little, but it is regarded by the men as a forerunner of better wages and better times in store.

The Corbin management of the Reading property expect to save \$2,000,000 per year by leasing iron furnaces and ore lands now idle and unproductive, by leasing its collieries, by altered methods of handling coal at shipping points, by closing the London and New York office and the restaurant, by reducing legal expenses, and by abandoning the Jersey Central lease.

IMPORTANT.

When you visit or leave New York City save Baggage, Expressage and \$3 Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot. 618 Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best. Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city. 23-1y

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

An unique boy: off is in force at Mechanicsville, near Saratoga. A short time ago a young lady was reinstated at that place on condition that she would sever her connection with the Knights of Labor and that she would never again join a labor organization. Last Friday she attended a ball given by the Knights of Labor. No one noticed or paid any attention to her. She was allowed to go to supper alone, although she had heretofore been a favorite with the young men.

NEW COAL FIELDS.

Enlarging and Extending Works Along the Pittsburgh and Rochester—Mines Along the Low Grade Roads.

Of the steadily developing soft coal fields of western Pennsylvania none have made more rapid progress the past three years than has been made in Jefferson county. The first large openings made in the lower Freeport coal seam were made along the Low Grade division of the Allegheny Valley railroad. Large and extensive mines were opened and are operated at New Bethlehem, Fairmount City, Oak Ridge, Reynoldsville and Du Bois, from which large amounts of this coal, of excellent quality, has been going into the Buffalo and eastern markets. The building of the Rochester and Pittsburgh railroad, three years ago, through Du Bois and up this point, opened up a large territory not heretofore reached by rail. Large capital was invested and extensive coal and coke works planted at Walston. The coal seam averages about six feet in thickness. It has proved to be an excellent coking coal, and the district bids fair to become one of the largest coke producing fields outside of the Connellsville region. In addition to the large works at Walston, where 500 ovens are now in blast, and to which plant 200 more will be built in spring, this company are busy opening up a new mine and grading for another plant of 500 ovens.

Large tracts, near Punxsutawney, containing this seam of coal have recently been purchased by other coal operators, among them John Whitehead, the veteran Clearfield operator, and Berwind, White & Co., also of that district. It is also among the possibilities that the Pennsylvania railroad company will soon enter this field. Their coming will be by the extension of the Bell's Gap road to Punxsutawney, and then by branches into different parts of the coal field, getting the coal east to their main line via Bell's Gap road.

The first to develop the coal in this part of the state was the Rochester and Pittsburgh coal and iron company who are now operating large mines at Walston and at Beech Tree in Jefferson county. They opened two large mines at Walston, one mile and a half from Punxsutawney. These openings are drifts into the Lower Freeport seam running from six to seven feet in thickness. No. 1 on the left side of the ravine and No. 2 on the right opposite to No. 1. Large and complete tipples were erected at each mine. On either side of the ravine from the tipples down are two continuous strings of the latest improved bee hive coke ovens, 500 in number, to which will be added 200 more in the spring, making it the largest single coke oven works in the world. An excellent coke is made from this coal, for which a large trade has been secured in the eastern and western markets. Both mines are ventilated with large fans. About 600 men are steadily employed, the miners receiving 36 cents per ton for run of mine. The company has two hundred large dwelling houses, together with the other necessary buildings, and are now erecting a large hotel for the accommodation of the officials and clerks; also a neat laboratory for the use of their chemist, who keeps an analysis of the coal before coking.

A new double track slope opening is now being made a short distance to the right of No. 2 mine. This opening is going into an extensive pit of coal, and will become, when fully developed, one of the largest mines of the company, with capacity of 2,000 tons daily. The very best of machinery is being placed in position. The engines are 250 horse power and the drum ten feet in diameter.

The Beech Tree mines of the company are located eleven miles east of Du Bois, on the Rochester and Pittsburgh railroad. This is also a fine opening into the Freeport seam. Owing to scarcity of cars about two-thirds time is made here. At present about 275 men are employed here. The miners receive 47½ cents per ton of mine. A number of new houses are also being built here.

This company are now grading and building a branch road to Elk Run, three miles from Punxsutawney, where large mines, to be known as the "Adrain," are being opened. A plant of 500 coke ovens will also be built here, about 300 of them in the spring. The openings are being made into a fine piece of coal, and no doubt the Adrain will become one of the largest coke-producing districts.

Bell, Lewis and Yates are among the largest miners and coal shippers. In addition to the 100 cars shipped daily from their Rochester mine, at Du Bois, they became interested in the Powers, Brown & Co.'s four large mines at Reynoldsville on the reorganization of that company and handle all the coal from there. They also take all the coal of the Walston, Beech Tree, Springer, Coal Glen and the three Dagus mines. The Rochester mine, located at Du Bois, has a large drift opening into the lower Freeport seam, averaging from 6 to 6½ feet in thickness. The underground workings are very extensive, and have been worked far back in the hill. A locomotive runs in on one side three-quarters of a mile to the gathering point, and on the other side one-third of a mile. Their large tipples and dumping machinery are very complete, enabling them to load coal in any grade desired. From this tipple

as high as 2,280 tons have been loaded in a day. Alongside of the tipple is a block of 60 large coke ovens now in blast making a good grade of coke from the coal screenings. The underground workings are well ventilated with a large fan. While the mine is not running to its full capacity, some 520 men are now employed, the miners receiving 35 cents per ton for run of mine coal.

Powers, Brown & Co. control all the mines in the Reynoldsville field. The Reynoldsville coal has a fine reputation in the market, and since the present management took hold the mines have run pretty steady, except time lost during the strike. Their oldest and largest works is Soldier Run mine, which has been worked far back in the hill. This opening is reached by an incline plane 300 feet long. Alongside of the tipple a block of 31 large beehive coke ovens are in blast, and a new block of 21 more is now being constructed, making a total of 62 ovens, in which all the screenings will be manufactured into coke. The coal seam averages five feet in thickness. The underground workings employ 180 men. The company is locating and grading a trainroad one mile and a quarter in length around the hill, where another large drift opening will be made into an extensive body of coal. This road will be laid with steel rails and a locomotive placed upon it to bring the coal forward to the tipple. When this new work is ready the old opening will be abandoned as the coal now being worked on the left side can be secured through the new opening and that on the right through the Pleasant Valley mine, thus cutting off the present long underground haul with mules and doing away with the incline plane. The other three mines are also drift openings into the same seam of coal. The Pleasant Valley employs 90 men and the Hamilton mine about 130. The coal in these three works averages five feet in thickness. The miners receive 60 cents per ton for screened coal. The Sprague mine was the last opening made. It is three miles back from town, employing 80 men. The coal back here will average six feet. The coal from these mines are all run of mine, the miners receiving 35¢ per net ton. Between 75 and 100 cars are shipped daily from Reynoldsville, yet the mines are not run to near their full capacity, owing to scarcity of cars.

The Coal Glen mine of the Jefferson coal company was opened something over a year ago on the Beech Tree branch, two miles from Beech Tree. It is a drift into a four foot seam. They are running steadily when cars can be had. The mine is in good condition, being ventilated with a Murphy fan. They are now able to increase the output when cars can be had. The miners receive 45 cents per ton for run of mine coal.

The Falls Creek coal company are operating the Dixon mine, two miles from Falls Creek Junction. This is a drift opening into the coal seam averaging about five feet. They are running as steadily as cars can be had for shipping the product. About eighty men are employed, receiving 35 cents per ton for run of mine.

The Oak Ridge mines are located two miles above Fairmount, on the opposite side of the river, in Armstrong county. Two openings are operated here—one in the five foot seam and the other in the four foot seam above. The coal is run down incline planes to the tipples. Every thing is kept in excellent order about their works. About 45 cars are loaded daily when cars are received. In and around the mines 200 men are employed, receiving 55 cents per ton for screened coal.

The Fairmount coal and iron company is operating several large collieries at Fairmount City, twenty-one miles east of Red Bank. Owing to the prevailing car famine, only about half time has been made the past two months. The large mine here is reached by an incline plane from the tipple, 700 feet up the hill side, from which point a train road is run around the hill, a mile and a half to the different openings. The coal seam averages six feet. A small locomotive hauls the coal cars from the mine mouth to the top of the plane. They are also operating the lower four foot seam. Their 40 coke ovens are also in blast. The firm employ 250 men. The miners receive 35 cents per ton.

Northern British Coal Trade.

The serious condition of the northern coal trade, as illustrated by that of Northumberland and Durham, has called for energetic action by the coal owners. Within the last few weeks several meetings have been held, and the position of the trade has been thoroughly discussed. A month ago the owners decided on the abolition of the sliding scale which has hitherto governed the rate of wages. Since then several collieries have reduced the number of their workmen; coal shipments have declined and prices are considerably lower than they were a few months ago. It is asserted that in but few cases have the prices left anything like a profit, several collieries having lost money, and it is urged that only a reduction in the cost of production will induce some of the owners to carry on their work during the winter months. All the meetings of owners during the past few days are conducted in private; but a Newcastle correspondent is informed that at a large and representative meeting of the coal owners of the north of England, held at coal trade offices, in Newcastle, on Saturday, a committee was formed to draw up suggestions of means to improve the trade, and to submit those suggestions to a future meeting. From the tone of the meeting it is inferred that the position of the miners will be directly affected by the suggestions.—*Midland Counties Express*, (Eng.) Nov. 6th.

A NUMBER of discoveries of coal seams have been made recently in various parts of Oregon.

Lehigh Valley Coal Tonnage.

The following tables give the shipments of coal over the Lehigh Valley railroad and branches, as reported from the forwarding office at Packerton, Pa., for the week ending Nov. 13, 1886:

Anthracite Coal Received and Forwarded

From PENNA. & N. Y. R. R.	WEEK.	TOTAL
AND	Tons, Cwt.	Tons, Cwt.
WYOMING REGION.		
Sullivan and Erie Collieries	1,894 16	
Pleasant Valley do	29,528 17	
West Pittston B'ch do	21,091 18	
Del. & Hud. Canal Co.	114,830 10	
All other Collieries.	37,675 10	1,554,829 02
Lehigh Canal, Mauch Chunk		
Total	38,490 03	1,721,565 03
Same time last year	38,282 17	1,494,977 07
Increase	1,069 15	226,587 16
Decrease		
HAZLETON REGION		
For Rail	58,394 07	2,185,102 04
do do to S. H. & W. R. R.	1,210 02	62,826 02
Lehigh Canal, Mauch Chunk	1,069 15	20,562 17
Total	60,673 02	2,268,511 03
Same time last year	73,562 06	2,294,481 08
Increase		
Decrease	12,918 07	25,973 05
UPPER LEHIGH REGION		
For Rail		
Same time last year		
Increase		
Decrease		
BEAVER MEADOW REGION		
For Rail	18,916 08	744,097 05
do Rail S. H. & W. R. R.		12,522 11
do Lehigh Canal, Mauch Chunk		1,152 00
Total	18,916 08	758,171 16
Same time last year	21,685 15	713,815 16
Increase		44,356 00
Decrease	2,769 07	
MAHANOY REGION		
For Rail	37,651 06	1,443,157 16
do Lehigh Canal, Mauch Chunk		1,206 09
Total	37,651 06	1,444,364 05
Same time last year	35,405 01	1,413,743 10
Increase	2,246 05	30,620 15
Decrease		
MAUCH CHUNK REGION		
For Rail		
Same time last year		
Increase		
Decrease		

TOTAL ANTHRACITE RECEIVED		
From Wyoming Region	38,490 03	1,721,565 03
do Hazleton do	60,674 02	2,268,511 03
do Upper Lehigh do	18,916 08	758,171 16
do Beaver Mead. do	18,916 08	758,171 16
do Mahanoy do	37,651 06	1,444,364 05
do Mauch Chunk do		
Total	155,731 19	6,192,612 07
Same time last year	168,906 02	5,917,021 01
Increase	13,234 03	277,591 06
Decrease		
Forwarded East by Rail from Mauch Chunk	117,242 15	4,697,245 11
Same time last year	127,021 11	4,615,025 02
Increase		82,220 09
Decrease	9,778 16	

Distributed as Follows:

Local East of Mauch Chunk	2,571 11	89,354 16
Forwarded East use L V R R.	3,478 13	144,665 14
Delivered to Furnaces and Mfg. Companies	16,755 06	761,452 06
Mfgs Berks & Lehigh R. R.		63 11
" Ironton R. R.	90 03	3,120 05
" Coal & Fog. R. R.	216 11	8,541 00
" East Penn. R. R.		169 18
" Perkiomen R. R.	4,096 07	126,152 16
" Bethlehem Branch P & R R. R.	2,991 19	98,431 13
" Port Del.	11,878 16	279,430 03
" New Jersey Division	40,521 00	1,784,705 10
" M & E Div. D. L. & W. R. R.	708 02	80,720 13
" Penn. R. R. Del. Div.	33,836 15	1,308,898 58
" Central R. R.	96 12	4,807 12
" do and do		
" do for use L V R R	4,450 10	118,850 00
To P & N Y R R.	30,507 08	1,054,179 17
To Lehigh Canal & R. R.	375 06	2,837 06
Philadelphia & Reading R. R.		
To S. H. & W. R. R.	1,210 02	76,164 03
To L & S Div. C. R. R. at Packerton for rail		319 10
To Individuals at Mauch Chunk	256 14	6,227 06
To do above do	607 11	25,681 03
To Lehigh Canal do	1,069 15	22,941 06
To Catawissa R. R.		
To Del. & Hud. Canal Co., Wilkes-Barre		
To L & B R. R. at Lackawanna Junction		61,596 01
Total	155,731 19	6,192,612 07

Bituminous Coal Received.

From P & N Y R R.	526 07	2,702 02
do all other sources		39,609 04
Total	526 07	42,311 06
Total Anthracite	155,731 19	6,192,612 07
do Bituminous	526 07	42,311 06
Grand Total	156,258 06	6,234,923 13

COAL DELIVERED TO AND RECEIVED FROM P AND N Y R R.

Delivered to them.		
From Wyoming Region	29,168 98	1,013,616 11
do Hazleton do	961 17	27,472 05
do Beaver Meadow Region	638 08	1,850 03
do Mahanoy do	43 14	11,234 18
Total	30,507 08	1,054,179 17
Received from them.		
From Sullivan and Erie Region	693 03	1,894 16
do Pleasant Valley do	121 10	29,528 17
do West Pittston Branch		20,992 08
Total	814 13	52,416 01
Total Anthracite Coal	31,322 01	1,106,595 18
do Bituminous do		2,702 02
Total delivered and received	31,322 01	1,109,298 00

Trade outlook is good.

TRADE REVIEW.

THE COAL TRADE.

The anthracite coal trade continues active, although the mild weather of the past few days resulting in a slight depression in household or domestic consumption. It is not wise policy on the part of *pater familias* thus to hold off in orders because of any moderation in weather, which at the best can only be slight. The cold season must of necessity close in upon us in a couple of weeks at least, when anthracite fuel will be an absolute requisite and under the pressure of crowding orders be difficult to obtain, and in all probability rate higher in cost. It is an *ignus fatuus* on the part of the consumer to follow the fancy that open weather in the last days of this month or the early ones of December will result in any important concessions in price. The coal companies are determined in their resolution to mine coal at a profit, or not at all. And no honest or reasonable man will dispute the justice of their resolution. For the first six months of the present year they gave the public the benefit of another policy, selling coal at 70 cents per ton under the prices of '84 and 30 cents below the ruling rates of last year. The result of this is shown in the insolvent conditions of several of the companies, while it is a fact that none of the \$500,000,000 invested in coal properties have paid, or are paying more than two per cent. Those who have seen their capital slip through their hands in the periods of depression will never be able to recover it. While endeavoring to retain what they have and to realize a legitimate profit on it, they have been met by the partisan outcry of a pair of political gamblers clothed with a fast receding authority, who have tried to deceive the public into a belief that they were the victims of a great oppression. This, because the managers of the most important coal operations agreed in August not to mine or ship more coal than the market demands would warrant, and have since advanced prices 30 cents per ton, leaving them still almost ten cents below the rates of last year. Yet, despite this resolution and the cry that it was intended to illegitimately curtail production to the public detriment, the output for this year is already far ahead of last year, and by the close of the year will aggregate 34,000,000 tons, the largest production ever known in the trade. This increase in output is a legitimate and healthy one—it is all that public demand and transportation facilities have warranted; and he, or they, who anticipates that the coal managers will go beyond it, is not wise; nor are those who count on reduced prices, when the scale is yet below that of the past, and is not oppressively high. We believe, as we hope, that the day of go-as-you-please mining, with its cut-throatism in prices, is past forever, and that sound business principles and cordial co-operation will in future, as at present, rule the coal trade management.

The approaching close of navigation, which was fixed for the 25th, but extended through the mild weather, caused shippers to press all products possible forward to tidewater, making things brisk for the carrying companies. The Reading road is said to be refusing coal and freight business because of a lack of equipment. It is, also, said to be about completing an arrangement for the transfer of a half million tons of coal traffic to the P. S. V. road, which is now fully open to this coal field. This tonnage is to come from the collieries north of Shenandoah, and the new road is to take it at fifty cents above the cost to the Reading loaded on cars at the breakers. This product the Pennsylvania road desires for its western trade which is now beyond its own producing capacity. That it may rapidly and promptly place this coal in the west, it is also increasing its rolling stock. On this arrangement of the two companies is based a reasonable prophecy of peace, and also a prediction that next year's output of anthracite will reach the grand figures of 35,000,000 tons. To do this it is only necessary that there shall be easy access to the markets of the west, which the Pennsylvania can give at once, and the coalition of the Reading with the Baltimore and Ohio, and the coming West Penn, will eventually provide.

There is no unhealthy accumulation of coal at Port Richmond. The stock of anthracite on hand at all tidewater shipping points is low, it being officially reported by John H. Jones, the accountant for all the anthracite companies, on October 31, '85, as less than half a million tons. It is now looked upon as certain that there will be no stoppages at the mines

prior to Dec. 23, when of course the annual holidays lay-off will ensue. There has not yet been any definite settlement of the quota of output for December, nor can it be known until after the managers' meeting today. The estimated figures range from 2,225,000 to 2,500,000 tons. These figures are considerably ahead of those fixed for the same month last year, yet the close of that month showed that the allotments had been exceeded by three-quarters of a million tons.

There are signs of improvement in the bituminous trade, and prices are reported as much firmer. Operators and dealers affect to see a roseate hue on the horizon of the coming year, and are making preparations for a brisk season. Competition for the railroad and other large contracts will be brisk between the miners of the four leading bituminous regions, Pennsylvania, Maryland and the two Virginias. From all quarters come reports of new projects in mining and transportation, with a view to greater and more profitable traffic.

In the coke region, the main point of interest is the impending strike in the Connellsville field. From 12,000 to 15,000 men are on the brink of following what, under all the circumstances, looks like a suicidal policy.

The total amount of anthracite coal sent to market for the week ending November 13, as reported by the several carrying companies, was 755,837 tons, compared with 816,648 tons in the corresponding week last year, a decrease of 60,811 tons. The total amount of anthracite mined thus far in the year '86 is 27,871,242 tons, compared with 27,227,999 tons for the same period last year, an increase of 643,243 tons. The following statement gives the gross tonnage for each of the leading coal carrying companies for the week ending November 13, and for the year to same, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R. R.	322,067	12,394,198	1,848,066	1,546,132
Lehigh Valley	155,731	6,192,612	5,917,021	1,274,591
D. L. and Western	116,223	4,130,900	4,317,507	1,133,393
Shamokin	15,137	725,497	855,884	1,260,387
Und. R. R. N. J.	41,194	1,473,817	1,526,875	D 53,058
Penna. Coal.	32,670	1,297,852	1,243,992	1,53,860
Del. and Hudson.	98,082	3,592,103	3,363,025	2,227,078
Pa. and N. Y.	46,525	1,775,814	1,571,849	1,200,965
Clearfield Pa.	56,239	1,919,734	2,494,425	D574,691
Han and B. Top.	12,461	575,744	546,326	1,29,418
Nor. and Wm.	18,892	742,853	514,945	1,228,908

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Nov. 13 was 323,028 tons, of which 210,037 tons were coal and 82,991 tons coke. Of this weekly tonnage 245,309 tons originated on the main line of the Pennsylvania railroad while the remainder originated on its branch lines. The total tonnage for the year thus far has been 13,054,156 tons, of which 10,024,911 tons were coal and 3,029,245 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending November 20, was 319,000 tons, of which 37,300 tons were sent to and 37,100 tons shipped from Port Richmond, and 24,000 tons were sent to and 27,500 tons shipped from Elizabethport. Vessels are reported in fair supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 85c. to 90c. and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending Nov. 13 were 57,735 tons, and for the year to that date 2,166,354 tons, a decrease of 255,869 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—week, 44,806 tons; year, 1,630,889 tons; decrease, 41,299 tons. To Pennsylvania railroad—week, 2,710 tons; year, 218,699 tons; decrease, 143,067 tons. To the Chesapeake and Ohio canal—Week, 10,219 tons; year, 256,766 tons; decrease, 71,503 tons.

Freight Rates.

The following are the current rates of freight on Anthracite coal from Port Richmond, as officially reported Nov. 22, 1886.

To Bangor	.....	To Fall River	.....
" Gardiner	.....	" Providence	.....
" Portland	1.10 & dis.	" New York	.....
" Sacon	.....	" Baltimore	58 & alg.
" Portsmouth	1.15 & dis.	" Washington	60 & 70c.
" Newburyport	.....	" Norfolk	55 & 60c.
" Lynn	1.15 & dis.	" Richmond	70c.
" Boston	1.05 & dis.	" Charleston	.....
" New Bedford	.90 & dis.	" Savannah	.....

Chicago.

From the Industrial World.

The situation of the anthracite coal trade is assuming a more serious aspect every week as the cold weather approaches. There seems to be very little if any improvement in the movement of coal from the east, either by rail or boat. One of the largest yards in the city has not as much coal today as it had last May after the close of the winter season. The shortage on the first of the month aggregated fully 200,000 tons. Should the weather remain mild, and the straits keep open for a month still, the pressure would in a measure be relieved. As it is, lake freights at Buffalo are quite active, with numerous offerings at \$1.50 to Chicago. The bituminous coal trade has been restricted somewhat from the same causes which are met with in the anthracite business, lack of cars. The movement of coke is a little heavier, and is stimulated by the shortage of hard coal.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.	
Per gross ton by carload, 2240 lbs.	
Grate.....	\$ 15
Egg.....	6 15
Stove.....	6 45
No. 4.....	6 45
Lehigh Lump.....	8 10
No. 4.....	6 75
Per net ton by carload.	
Grate.....	\$ 5 50
Egg.....	5 50
Stove.....	5 75
No. 4.....	6 00
Nut.....	5 75
Lehigh Lump.....	7 60
BITUMINOUS.	
Erie & Bralrhill.....	\$ 4 50
Pittsburg.....	3 50
Indiana Block.....	2 50
" Slack.....	1 25 @ 1 35
" Nut.....	1 65 @ 1 75
Baltimore & Ohio.....	3 00
Hocking Valley.....	3 00
Youghiogheny.....	3 00
Wilming.....	2 10
Blossburg.....	3 50
Cumberland Smithing.....	3 70
Sonman Shing.....	3 80
Grande Creek.....	2 00
Mountain County.....	2 00
Clinton Lump.....	2 00
Streator.....	2 00
Minonk.....	2 00
Morris.....	2 00
CANSEL.	
Kanawha.....	5 00
Buckeye.....	4 35
COKE.	
Connellsville Coke.....	4 75 @ 5 00
Crushed Coke.....	4 75 @ 5 00
Charcoal, carload per bu.....	85 @ 90

Pittsburg.

From the American Manufacturer.

For the first time in three months the Ohio river coalers, enough water for sending out loaded coal craft. On the previous freshest shipments commenced on the 18th of August, on the present rise they commenced on Monday morning, the 15th inst., and up to this writing operators say 2,500,000 bushels have gone out. It is still raining as we write, and the prospects are that all the loaded "barges" can be sent to market, making a total shipment of from 7,000,000 to 8,000,000 bushels on the water. There is quite a number of "boats" loaded at the "roads" and if the rivers should rise high enough they too will of course be sent out, increasing the totals very materially. At present, prices in the lower markets are unchanged, but they will almost certainly decline very considerably on account of the coal that will soon be received from this port and (no doubt) from the Kanawha Valley. We quote as follows:

PRICES AT PITTSBURGH.	
River, wholesale, on board.....	4 @ 5 cts. per bushel.
Railroad.....	4 1/2 @ 5 cts. per bushel!
AT CINCINNATI.	
River, wholesale, on board.....	10 @ 11 1/4 cts. per bushel.
AT LOUISVILLE.	
River, wholesale, board.....	10 @ 11 1/4 per bushel.
AT NEW ORLEANS.	
River, wholesale, on board.....	28 @ 30 cts. per bbl.

Bushels are rated among dealers here at 76 lb.—26 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4/7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

In the Connellsville region all the coke ovens are still in operation, except those that are idle on account of the fire in the Standard mine, and cars are more plentiful. We continue to quote under: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Nov. 20, 1886:

	Week.	Year.
	Tons.	Tons.
Shipped North.....	15,721-11	2,136,359-16
Shipped South.....	60,688-11	2,410,950-19
Total.....	116,410-02	4,547,310-15
For corresponding time last year.		
Shipped North.....	79,276-11	2,158,525-16
Shipped South.....	56,497-08	2,294,750-12
Total.....	135,773-19	4,453,281-08
Increase.....	19,363-17	94,029-07
Decrease.....		

The coal combination suits still hang fire.

ACCIDENTS IN MINES.

HOW THEY OCCUR AND THEIR RAPIDLY INCREASING NUMBERS.

A British Commission's Good Work.

From "Transactions of the Mining Institute of Scotland."

(Continued from Page 396.)

Stress is also laid on driving the working places as rapidly as possible, by putting an ample number of workmen in each wall face, so as to expose the least number of men to danger at any one time. Less coal will be opened out for the same output; there will be fewer roads to keep, and the places will not be kept so long hanging on wood. But where there is a number of men in one place, is there not more noise and confusion, and will that not tend to prevent any working or settling of the roof being observed, and will not the men depend on one another? Whether what we have ventured to call the co-relation of accidents comes into play here is also a point which can only be profitably discussed by practical men.

The commissioners indicate that coal cutting machines may contribute to a reduction of accidents of this kind, by reducing the time the men spend at the face exposed to risk of falls.

It is understood that the mines regulation bill, recently introduced by the home secretary, was based on the commissioners' report. It seeks to enact that where the timbering of the working places is done by the miners, suitable timber is to be provided at convenient places, and the distance between the props and also between the sprags or holing props, is not to exceed six feet.

The commissioners say spontaneous combustion leads to fatal accidents. They have themselves made no experiments on the subject, and it rests where it was left by Abel and Percy in their report to the royal commission appointed to inquire into the spontaneous combustion of coal in ships.

In the evidence the opinion is always given that spontaneous combustion, when it arises in the small coal left in the waste, is due to the decomposition of pyrites; and that when it occurs in pillars, it is caused by the heat set up by friction and slipping. The latter opinion seems to be based on the fact that when a crush is taking place in pillars, the temperature of the mine is considerably augmented, but we are not aware that any direct experiments have been made to ascertain the amount of caloric produced by the crushing of coal.

The presence of moisture promotes oxidation of pyrites by bringing the oxygen of the air into intimate contact with the surfaces of the oxidisable material. If the pyrites and coal be so covered that the heat as it is generated does not escape, it will burst into flame. But coal takes fire in which there is no pyrites, and which is perfectly dry, and there is at least one example in Scotland of spontaneous combustion in a shaft pillar where there was no crushing, and coal has been known to ignite on the sides of main roads where the whole intake air was passing, and, consequently, the heat was in way bottled up. So the oxidation of pyrites in the presence of moisture, and the heat caused by friction and crushing, do not account for spontaneous combustion in every case.

We are all largely acquainted with the development of heat by friction, and it is only natural that we should account for what we observe by causes with which we are familiar. But is there no other way in which the heating may be accounted for? Let us see. Take an ordinary gas burner and a fine platinum wire. Let us twist this wire into a spiral form, so as to bring as much surface as possible into a small space; let us now heat the spiral slightly in the flame, then extinguish the flame, allow the gas to play freely on the wire. We notice that the wire grows hotter and hotter until it becomes incandescent and re-ignites the gas. Here, then, we have a case of spontaneous combustion caused by the presence of a metal, not only incombustible but the most refractory substance known. How do we account for it? The noble metal platinum has the power in a superior degree of condensing certain gases on its surface, and in this condensed state they are brought within the range of their chemical attraction and unite with evolution of heat, which accumulates in the wire to such an extent that it becomes hot enough to ignite the gas. The platinum itself undergoes no change; simply by its presence it enables the combination to take place, and when a body has this power it is said to exert a catalytic or contract action. Why is it called catalytic action? The celebrated Swedish chemist, Berzelius, who investigated the subject, thought that this action was caused by a new force which he termed Catalysis. There is reason to be-

lieve this force was purely imaginary, and the phenomena, although they can be accounted for by actions with which we are more or less acquainted, are yet not well understood, and in using such a word as catalysis we are simply attempting to bury our ignorance beneath a sounding name.

We have thus fully considered this catalytic action because as we will see by and by, it has an important application in fire damp indicators, and will also come into notice when we discuss the action of incombustible dusts in determining the ignition of gas and air mixtures.

Carbon has a property somewhat akin to this action of platinum, having the power of condensing within its pores something like nine times its volume of oxygen. This condensation is, of course, accompanied by the development of heat. We have then the development of heat and the establishment of oxidation taking place at the same time. If we have an open porous coal crushing, we have whatever heat is generated by friction; a large surface of small coal exposed, which occludes the oxygen of the air and causes heat by condensation; and the substance condensed is the oxidising material itself, which is thus brought into the most intimate connection with the carbon. We have the smallest of the crushed coal in the centre of the pillar with the larger masses thrown over on the outside in such a way as to keep or bottle up the heat which is generated. Therefore, therefore, a great many forces all tending to the same result, which may ultimately start combustion by inflaming the finest dust, and this, without calling into play the action of pyrites and moisture, which are known to be often absent.

In this way the charcoal used in the manufacture of gunpowder has been frequently known to take fire.

The experiments of Richter have demonstrated that oxygen is absorbed by freshly gotten coal, with the evolution of carbonic acid and water, while part of the oxygen is fixed in it by the formation of some solid oxygenate. Therefore, therefore, the oxidation of coal is thus established, and is at least one of the causes of the so called spontaneous combustion in mines.

Closely connected with accidents from explosions is the subject of ventilation, and the commissioners are satisfied that the main problem of producing a current has been solved, as furnaces are in existence in deep shafts circulating volumes of from 200,000 to 400,000 cubic feet per minute, and there are mechanical ventilators passing quantities of from 100,000 to 250,000 cubic feet per minute. Continental miners, who have not been able to circulate such quantities, have shown, as may be noticed in Mr. Moore's review, that from 25 to 50 per cent. of the air entering our mines is lost by leakage before reaching the working faces. The commissioners, while recognizing this, point out that as long as a sufficient body of air for the dilution of gas issuing from the coal reaches the face, the leakage serves a useful purpose in preventing stagnation in the worked out parts of the mine.

Mechanical ventilators have often been injured and rendered useless by explosions, at a time when they were most needed, and the commissioners suggest that the fan should be placed at a safe distance from the shaft, and the mouth of the upcast slightly covered over that it will, in the event of an explosion, give way before injury is done the machine. It will be observed that this is a provision the mining bill recently introduced by Mr. Childers.

The commissioners lay stress on the continuous registration of the work of the fan, and point out that a second engine in reserve is a valuable adjunct.

Mr. Moore and Mr. Alexander give evidence that a greater number of explosions happen on the first two days of the week, and it is suggested that this may be due to the leaving of the ventilating furnace unattended during Sunday, and stoppages; and another provision introduced into the mining bill, is that ventilation is to be constantly produced at all times by day and by night throughout the year.

Systems of working doing away with doors, which are a constant source of peril, and the adoption of separate splits, especially for different seams, are recommended as practicable means for the localisation of explosions.

The subject of ascensional ventilation, imperative in Belgium, is discussed, but no recommendation is made; and the commissioners also consider whether it is desirable to insist, as in Prussia, on a certain minimum quantity of air being supplied to every colliery, based either on the number of men employed, on the area of the workings, or on the amount of coal raised in a given time; but they think it doubtful whether such a standard of ventilation could be advantageously employed.

The commissioners are disposed to regard the facility for ventilation attending upon the longwall system as insuring the safest working where such system is applicable.

[TO BE CONTINUED.]

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by post card or number, and we will, if possible, re-mail all missing numbers.

AMONG THE ENGLISH WORKINGMEN.

A Coke Operator Describes the Industrial Depression and the Condition of the Cokers and Miners.

Colonel J. M. Schoonmaker, a member of the coke syndicate, who has just returned from a tour of the manufacturing districts of England, makes the following comments on the conditions of trade: "I found it terribly depressed. I made a journey from London to Sunderland to see the condition of affairs in the coal and iron districts of the north. I was met at the station by the Earl of Durham's agent, and as we went from there to the hotel I noticed large numbers of idle men about the streets. I asked my companion and he said, 'No; those men have no work to do. There are 5,000 idle men in this town alone who do not know where their next meal is coming from. The town council appropriated \$10,000 last winter to employ them in grading the river banks, but this money is all gone now and we have no money to apply to the purpose this winter.' Those men all seemed bright, not particularly well educated, but men of good common intelligence and a large proportion of them good skilled mechanics. They seemed to bear their misfortune bravely and patiently, and my heart went out in sympathy for them. There is not one of them who would not be glad to come to America; in fact, they would swim over if that were possible, but they have no money to pay their passage. There are as many idle men in New Castle and thousands more in other parts of the country."

"From there I went to the Earl of Durham's colliery, at Fence Houses, between Sunderland and Durham, to see the coke works. I found them in no respect ahead of us and only noticed one difference in their way of working. That is, that instead of charging the ovens from the top from a larry as we do, they do it from the front. The car is brought to the front and a slide is stretched from it to the oven's mouth. A man shovels the coal into the oven along the slide and gets the nut and slack more evenly distributed than we do. We dump it from the top so that it forms a cone, with the nuts in the middle and the lumps at the sides. But the chargers there get only 10 cents an oven, equal to fifty or 60 cents a day, while we should have to pay a laborer \$1.50 a day for the same work, so that we could not not afford to have it done in that way. They work a 3½ foot seam of coal, so that the miner has to lie down to dig it. The miners earn from 90 cents to \$1.10 a day, and some of them as high as \$1.20 a day. They do not have any breakfast speaking of, simply bread and tea, and the same at other meals. They have meat for dinner only twice a week, and then they boil it and make vegetable soup. The houses are undoubtedly good and clean and their sanitary arrangements are excellent. An inspector goes around regularly and examines everything, even to their clothing."

Then I went to Glasgow, where James Bell, a cousin of Sir Isaac Lowthian Bell, showed me his furnaces near Glasgow, on the Caledonian railroad. He has about 300,000 tons of pig iron stacked there. It is the same all the way from Glasgow to Edinburgh. You see great stacks of pig iron piled like cordwood about the furnaces. It is the same in the Cleveland iron district. Bell told me that there were only watching for the American market to advance high enough to allow them to ship his immense stock, pay the duty and have even a little little as 25 cents a ton profit left over, and he would send 15 cargoes to America. The same state of affairs exists in Belgium, for at Liege I saw vast piles of raw steel all ready for shipment when the chance comes to make the least profit on it. What those idle men are going to do God only knows. Their industries are vanishing from before their eyes, they are building no ships and thousands of skilled mechanics have no work to do. With such a state of affairs existing over there we ought to be careful not to advance prices so as to create a boom which would open the way to a flood of importation. What we want is a good, steady demand at moderate prices. I have every cent invested in the coke business and what injures me injures my workmen. Our interests are one in not foolishly advancing the cost of our product."

The Connellsville coke operators on Saturday sent a letter to the officials of the miners' amalgamated association rejecting the proposition of the latter to settle their differences by arbitration, and declining further conference on any point raised "until past promises of the men have been fulfilled and a disposition shown to do what was right." In the afternoon the miners' delegates held a meeting to consider the action of the operators. It was decided to return to the coke regions and call a meeting of the representatives of all the mines at once. "We have not the power to order a strike," said secretary McMullen. "We only presented the demands which we believe to be just. The operators even refuse to erect scales, which is required by law. We are willing for any board of disinterested persons to decide upon our claims. I predict a struggle, and, if there is, the operators will be responsible. Some of the men may strike as soon as they are informed of the syndicate's action."

The mines at Peach Orchard, Ky., are running full time.

INDUSTRIAL EDUCATION.

What New Jersey is Doing to Foster Its Growth and Reap Its Benefits.

Industrial education—the training the hands as well as the mind—is a branch of the common school curriculum that will be established if the three hundred earnest and intelligent men and women who assembled at the Stevens castle, in Hoboken, N. J., last week, can accomplish it. The gathering was not an ordinary one. It was composed of those interested directly in education—school teachers, principals and school superintendents and those in authority who have influence in the halls of the New Jersey lawmakers—Governor Abbott, State School Superintendent E. O. Chapman, County School Superintendent Rev. Dr. Houghton, Judges McGill and Randolph, President Walker, of the Jersey City Board of Education; Professor Morton, of Stevens Institute; school trustees of Hoboken and other cities, and many visitors from various and distant sections of New Jersey—wealthy, public spirited, active and influential men, who can aid the progress of the society, which began in a humble way a short time ago to introduce in the public schools of the state the industrial branches. The experiment was first tried in the Hoboken public schools. They were introduced last December and graded lessons in sewing and clay modelling were taught. The movement was successful. The scholars were glad when the hour arrived to lay aside their books and dry studies for the needle and the clay. The expense has devolved entirely upon the society. They have been forced to be economical and were unable to extend the studies for the hand because of the small fund. They have expended \$375.27 during the nine school months. They have a balance of only \$56.82. The state allows from its educational fund \$3,000 to any school or society to assist technical education, provided the persons interested subscribe a similar amount. The association, convinced of the success of their proposed scheme as shown by the result in the Hoboken schools, desire to enlarge the scope of training in the schools in which it has been introduced and establish it as a branch in other schools of the state. The object sought was attained. The membership was increased by nearly two hundred, and all the money required to secure the state's allowance was pledged after the advocates of industrial education had explained to the people what it was. The school system of the state the people have reason to feel proud of. It is not complete; there is an insufficiency of accommodation, the laws were not sufficient, as the children of those who cannot appreciate the value of education should be compelled to attend school, but the system is as perfect as that of any state in the Union. The income of the fund accumulated from the riparian rights, which aggregate over \$3,000,000, is set aside for the benefit of educational institutions. The people bear without murmuring the tax for educational purposes. The association desired to engrave some practical features of industrial training upon the common school system, to educate the hands to in the future give the students the means of earning a livelihood. It was difficult to interest the people in any novel movement until they see that it is necessary, wise and judicious. Nothing concerns the people as much as education, especially in these times. Should children be properly educated with its novel, radical and dangerous ideas to enable them to discriminate and follow those which are conservative and wise and insure progress to the nation? Henry M. Alexander dealt with the question:—"Is it desirable to engrave it on our common school system?" He referred to the apprenticeship system that had been abolished through the action of the trades unions, and now improperly taught helpers were the result and unskilled labor. Something should be done to correct this and he believed industrial education was the means to give us properly trained mechanics.

Henry M. Leipziger, principal of the Hebrew technical institute of New York, made an interesting address, defining industrial education. He told of the success of the institution and the anxiety of the pupil to begin the industrial part of their school training. So interested had they become that they were loath to leave the school at the closing time, and lingered for hours. They first taught plain drawing, and then with cardboard and knife to cut out the manual labor which they had drawn; then ornamental drawing of the article first drawn, and with the aid of the knife and cardboard to add the ornaments according to the drawing of the plain object first constructed; they were next instructed as to the hand brackets and then carpenter's tools, and were taught mortising, dovetailing, all from their own drawings; then to construct boxes, desks, &c.; then wood turning and pattern making, and recently they had begun work in iron. This branch had been introduced in the schools of New Haven, Chicago and other cities, and had met with success. He referred to the dignity of manual labor and stated that King William and his family had trades and on the occasion of the King's last birthday he received from his grandson, a book bound by the donor.

Professor Morton pointed out the necessity for educating the hands as well as the brain. It gave

physical development and was beneficial in a moral aspect, as it would keep boys in their own work—hops and away from billiard tables and bad associations. It was essential, too, for a man to know how to drive a nail or use a saw. Mr. Algeron S. Sullivan and State School Superintendent Chapman also made arguments in favor of the system.—*New York Herald.*

Lead and Zinc.

The greatest lead and zinc region in the world extends from about six miles south of Granby, in Newton county, in a northwesterly direction across Jasper county to the Shoal Creek lines, just beyond the state of Kansas. It has a mean width of about fifteen miles, and the ores are found all the way from the depth of 25 to 250 feet. Joplin is almost centrally located within the above described area, and it is not therefore surprising that the richest deposits have been discovered within and near the city limits. There are four well defined strata of lead ore the first of which is found in places near the surface and extend downward fifty feet. This stratum is commonly called float mineral. The mineral found at this depth is, as a rule, found in "pockets," a single one of which has been known to yield over 3,000,000 pounds. The second stratum is found between the depth of fifty and ninety feet, and is usually in well defined "leads" with the same kind of wall, cap and stone. The third strata is between 100 and 150 feet, is well defined and runs from a northwesterly direction to the southeast. The fourth stratum is found between 150 and 250 feet of the surface. This has not yet been very extensively mined, but it is the best that has ever been prospected, is better defined, yields far more and better mineral easily worked and the supply is inexhaustible.

Zinc is not found in the first strata as lead, though in some instances it has been discovered near the surface. It by no means preserves the regular order of deposit that lead does, but may or may not be found in all three of the strata above described and between the same. Sometimes, in fact frequently, it is found where there is no lead. With extensive zinc works and numerous railroads mining has become its most lucrative branch of industry. There can be no doubt but the supply contained in the ground will last for ages yet to come.

There are several very fine smelters in Joplin, both for lead and zinc ore, so miners do not have to send their ore away for smelting. It brings cash on top of the ground.—*Joplin (Mo.) Plain Dealer.*

We cannot too strongly urge upon our readers the necessity of subscribing for a family weekly newspaper of the first class—such, for instance, as the *Independent*, of New York. Were we obliged to select one publication for habitual and careful reading to the exclusion of all others, we should choose unhesitatingly the *Independent*. It is a newspaper, magazine, and review, all in one. It is a religious, a literary, an educational, a story, an art, a scientific, an agricultural, a financial, and a political paper combined. It has 32 folio pages and 21 departments. No matter what a person's religion, politics or profession may be, no matter what the age, sex, or employment or condition may be, the *Independent* will prove a help, an instructor, an educator. Our readers can do no less than to send a postal for a free specimen copy, or for thirty cents the paper will be sent a month, enabling one to judge of its merits more critically. Its yearly subscription is \$3.00, or two years for \$5.00. Address, THE INDEPENDENT, 251 Broadway, New York City.

LABOR TOPICS.

The coke syndicate met on the 18th to discuss a settlement of the existing differences with their men. It was practically decided to grant the demands of the miners save on questions of weighing coal on tipples instead of wagon measurement as at present, and bi-weekly pays instead of monthly.

The colliers of Wales have voluntarily submitted to five per cent reduction in their wages in order to prevent a stoppage of work at the mines.

A dispatch from Shamokin, Pa., says that "the recent labor troubles in that valley did much to disintegrate the miners and laborers amalgamated association. Meetings which last year drew thousands are now hardly attended by hundreds. To create a new interest State President Harris and Daniel McLaughlin, of Illinois, have been engaged to work in the interest of the organization. The strike at Excelsior still continues. The miners have issued an appeal for aid. A number of employees have been ejected from the company's houses. The miners declare they will stand out all winter, and the operator says that he will not accede to the demand for the advance."

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ORE ROASTING FURNACE.

Description of Its Operation and Its Points of Superiority.

John Applegarth, of East Oakland, and Wm. Applegarth, of Fresno Co., Cal., has just patented an ore-roasting furnace with peculiar arrangements for equalizing, directing and controlling both heat and draft. Within the furnace is arranged longitudinally a horizontal hearth, under which is formed a flue, which may be divided into several sections by the longitudinal partitions which serve to sustain the hearth. Fire-chambers communicate directly with both the hearth and flue. These fire-chambers are located at each end of the furnace, and are arranged transversely thereof, and at right angles to the flue and hearth. They are provided with grates resting on ledges, which may be raised or lowered to rest upon any of the vertical series of said ledges. Above the centre of the hearth and transversely thereof is an arch which has an inclination upward from the front side of the hearth to the back, where it communicates with the stack. The bottom of the flue inclines upward from each end toward the centre, where it communicates through a central transverse passage with the stack. Set into the stack is a fan, mounted in a suitable casing, and adapted to be rotated.

The ore is supplied to the hearth through hoppers, fires started up and fans rotated. At the beginning of the operation, when an intense heat is required, the draft-controlling valves or gates and dampers are opened, while the fan is driven at a high rate of speed. The flames are divided immediately after leaving the fire-chambers, part passing through the flue and part through the hearth over the ore.

The object of the central transverse arch, inclining from the front to the back, is to avoid the tendency of the draft to draw the flame over toward the stack, whereby the front of the hearth, near the centre, is not heated as thoroughly as the back. This arch, by affording room at the centre, enables the heat to be equally distributed over the entire width and length of the hearth. When the operation has proceeded to a certain stage, and the ore has become thoroughly heated, it is necessary to control the draft in order to prevent the ore, which by this time has been reduced to a sort of dust, from passing off. In order to do this they adjust the dampers and the draft-controlling gates and regulate the speed of the fan so that they can obtain any amount of draft desired. The ore soon becomes heated very highly, and by a previous treatment to which these inventors subject it, and which it is unnecessary here to explain, the baser metals are volatilized and are drawn off through the stack, while the precious metals remain.

When it becomes necessary to stir the ore on the hearth they close down the damper by which the hearth communicates with the stack, so that the draft and flames are cut off from the hearth, and pass only through the flue. This is rendered necessary by the condition of the ore, which, if stirred while the hearth is open to the stack, will pass off in dust and be lost. When the stirring is completed the damper is again opened to whatever extent may be desired to control the draft and direct the flames. When necessary, the entire heat may pass through the hearth. It will thus be seen by this arrangement and draft-controlling gates that heat may be perfectly controlled and directed, being passed through both the hearth and flue, or either, as desired.

The object of arranging the fire-chambers transversely to the flue and hearth is to admit of making a matte fire-box and still use the ordinary length of wood. In furnaces where the fire-box is made in the end of the shell, and parallel in a line with the hearth, it is obvious that they must be made as wide as the hearth to distribute the flame over its width, and at the same time they must be made as deep as the wood requires. But by arranging them as here-in described the length of the wood, usually four feet, is enough to provide for the distribution of the flame over the entire width of the flue and hearth, and the chamber can be made of much less width, thereby saving fuel and obtaining a direct heat from all the portions of the fuel pile whose flames reach the hearth an flue immediately. The fire is therefore a transverse one and the gates or valves being on the ends of the furnace drive the flames directly at to the point desired. The advantage claimed of having the gates vertically adjustable is that when they are directing the flames wholly through the hearth they can raise them so that the flames can reach the hearth directly and thereby save fuel.

Of course these inventors know that the arrangement of hearth and flue by which the flames can be passed through both simultaneously, or either separately, is known, and that fire-boxes have been placed before this at both ends of the hearth and flue. They also know that a suction fan has been used to create a draft, and the draft distributed by dampers; but all these features have been tried in connection with furnaces differing from theirs essentially in the arrangement or disposition of their operating parts.

"More cars" is the cry at Straitsville, Ohio.



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-AT-

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FOR THE WEEK ENDING

SATURDAY, NOVEMBER 27, 1886.

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LABOR LEGISLATION.

A dispatch from Washington announces that an effort will be made to induce President Cleveland to call an extra session of the fiftieth congress as soon after the 4th of March as possible, with a view to securing the passage of important labor legislation. It is not stated whether or not the project has the approval of Mr. Powderly, although it is given out that it is a conception of leaders of less prominence. The idea, however, is a good one and will no doubt receive the general master workman's endorsement, as it will meet the endorsement of every Knight of Labor in the country. The difficulty of discussing and passing any measures demanded by the organization and by reformers generally at a regular session of congress has been often demonstrated, and if the legislation asked for the labor interests is to receive the consideration it merits an extra session becomes absolutely necessary.

What measures will be taken up if such a session is held it would be difficult to even conjecture now. The land question, the railroad question and the money question are, however, the most important, and of the three the land question is at this time perhaps the most urgent.

A bill was introduced at the last session to prevent aliens from acquiring real estate in the territories, but it was not reached, nor is it likely that it will be during the short session this winter. The evil which this measure is intended to arrest should have been dealt with long ago; but the absorption of our public lands by foreign capitalists, corporate or individual, was carried on so craftily and quietly that the abuse of the plain purpose of our laws and defiance of the spirit of American institutions, for some time escaped notice. Now our eyes are opened, and we learn with disgust and resentment that vast tracts in the most fertile sections of the national patrimony have been grabbed by British oligarchs who foresee that their own country will shortly become too hot to hold them, and who are planning to transfer to our fee soil the system of absentee and alien landlordism under which Ireland is suffering.

The extent to which this odious evasion of our homestead laws has gone is even yet imperfectly appreciated, but the partial list of alien landlords, recently laid before congress, has alarmed the public mind, and a full statement of the facts should be made as soon as possible. The interior department and the law department of our federal government could not be better employed than in exposing and defeating this monstrous confiscation of the people's inheritance. The poor men, for whom and for whose children the public lands were held in trust, will look to the government officials for a detailed and exhaustive disclosure of alien depredations on their rights, and will require congress to castigate the frauds by which alone the noxious incubus of foreign landlordism has been fastened on our country.

What do our hard-working fellow citizens, for whose future homes our public lands were supposed to have been set apart, think of the announcement that by trick and device a single British nobleman has managed to gobble up more than a million and a half of acres in the most valuable part of our public domain? Do they know that an area of American soil twice as large as the state of Rhode Island has fallen into the clutches of a single European landlord, who has never dreamed of becoming an American citizen, but who means to spend the revenues wrung from the occupants of his western principality, as the income wrung from the starving laborers are spent by the Irish absentees?

America will brook no anarchism, and we look upon alien landlordism as even more detestable and deadly. We will not suffer foreign countries to dump their outcasts on our shores, and we will endure as little migration of ideas and practices which the conscience of awakened England has condemned as public crimes.

The land-grabber must go, and it is the duty of congress to drive him out.

The trades-unionists, feeling that the Knights of Labor exhibited some hostility towards their organizations at the Richmond convention, are preparing to hold a convention of their own at Columbus, Ohio, early next month. They have a right to do, but however, little it may be desired the result of such a convention can only tend to widen the breach between the two organizations.

This is to be regretted, but difficulties of this kind will occur sometimes between the best regulated organizations. It is hard for a large body of men, though they all have the same object in view, to agree upon a plan to accomplish that object. The Knights and trades-unionists both aim at the accomplishment of the same purpose, but their methods are entirely different so much so in fact that we are not certain that there is not an abundance of room for both, and work for them to do.

About two months ago the mine inspectors met at the office of the secretary of internal affairs and agreed upon a system, to be adopted by all, of making their annual reports. The blanks for them have just been issued and the inspectors are now engaged compiling reports for 1886. The reports will be published, as last year, in connection with the report of the bureau of statistics, which also include the reports from the bituminous district, but whether separate volumes containing only the anthracite mine inspectors' reports, will also be issued as they were last year, is not yet known. It is expected that the legislature will take some action in the matter.

THE TERMINATION of the strike among the Chicago pork packers is another triumph of the conservative policy of General Master Workman Powderly. And it is creditable to him and highly significant of the growing moderation and reason of the powerful organization which he leads. The strike has resulted in a failure, but that is not the fault of the organization, but of the hasty action of the men who precipitated it. Had Powderly and the other heads of the order been consulted and their advice followed the strike never would have begun, as defeat from the start was certain. Reason must rule in all things.

THIRTEEN thousand workmen in the Connellsville coke region are expected to go out on strike. The merits of the dispute which is expected to culminate in throwing this large number of men out of employment on the verge of winter cannot be easily judged at this distance, but it does not take much of a philosopher to see that the wisdom of a strike at this season may well be questioned. The operators may be wrong in refusing the demands of the men, but if they have concluded to resist them, as dispatches from the scene state, the operatives are sure to lose by the strike no matter how it may end.

The Strong Engine.

For some months there has been undergoing construction at the Lehigh railroad shops in this city one of the Strong locomotives, an engine which promises to revolutionize the business in mountain regions. The engineer claims these advantages over ordinary locomotives: first, greater strength and consequently safety; second, economy in fuel; third, simplicity in construction. As to its strength it will haul heavy express trains up the mountains alone, whereas the present engines all require pushers, or extras. As to economy in fuel, the Strong engine will burn the cheaper grades of coal, as buckwheat, at, say, 50 cents a ton, while the ordinary engines require the best coal, costing at least \$2 a ton. As to simplicity of construction it is claimed that the Strong will require almost no repairs. Ordinarily an engine has to "lay off" a month every year for repairs, costing from \$500 to \$700, and these repairs are principally the replacement of stay-bolts or crown bars, the Strong engine doing away with these entirely. The engine weighs 110,000 pounds, nearly four tons more than any other express engine on the road. It has 62-inch driving wheels, a four-wheel leading truck and a two-wheel trailing truck behind. Though enormously heavy, its weight is so distributed as not to be harder on the track than the engines in ordinary use.—*Wilkes-Barre Record.*

During the month of October the Lehigh Valley railroad did a very heavy business in the handling of coal. The totals for the month show that 79,631 empty and 81,063 loaded cars were hauled over the Lehigh division. The largest number of empty cars hauled was on Oct. 21, when the number was 3,587. The largest number of loaded coal cars was 3,527, hauled on Oct. 2. The total number of cars hauled was 160,694, which, averaging 140 cars to a train, gives 1,148 trains, which, excluding Sundays, gives 44 coal trains per day. The company's freight traffic is also very heavy, averaging 10 through freights each way and 6 local freights each way, a total of 32 freight trains per day. The passenger trains number 15 each way, a total of 30 per day. This means that an average day's business on the Lehigh division of the Lehigh Valley road consists of 44 coal trains, 32 freight trains and 30 passenger trains—a total per day of 106 trains; or one train every 13½ minutes.

THE HONDURAS MINES.

What Supt. Robbins Has to Say on the Industrial Venture in South America.

A reporter of the Eureka, Nev., *Sentinel* has had an interesting conversation with Frank Robbins, formerly superintendent of the Eureka Consolidated and other mining properties in that district, concerning Honduras, Central America. Mr. Robbins is superintendent of some valuable mines in that country belonging to a New York syndicate of capitalists, and having come to San Francisco to purchase machinery, he decided on a visit of a couple of days to a visit to his old stamping grounds on the range. The following information gleaned from Mr. Robbins' remarks will undoubtedly prove of interest: The population of Honduras is about 400,000; the two principal towns are Tegucigalpa (meaning silver mountain), the capital, populated by some 12,000 people, and Comayagua, with probably 10,000. The latter was until recent years the capital of the republic, and both contain many handsome churches, universities, residences and other structures. The ports on the Caribbean sea, or north coast, are Puerto Cortez and Truxillo, both of which have fine harbors. Two lines of steamers run to these ports from New Orleans. On the south coast there is but one port, which is on the bay of Fonseca. It is at the island Isla del Tigre, and is named Amapala. Supplies from San Francisco, Panama and Germany are transferred from vessels at Amapala to barges that run up the bay of Fonseca to the two principal landing places, San Lorenzo and La Brea. From there they are transported by teams or pack animals, according to the season and condition of the roads, to Tegucigalpa, a distance of seventy-five miles, and other interior towns. From the north coast inland for about sixty miles, and from the Bay of Fonseca, on the south, a probable distance of ten miles, the country is rather flat, hot, and full of mosquitoes. Beautiful orchards of tropical fruits of all kinds are to be found there, also tropical grains, such as coffee. The mountains ascend gradually from the plains and are covered with resins and vegetation. In many respects they remind the traveler of portions of the Sierras on the California side. The valleys and plateaus at an altitude are very productive, and will grow anything, from potatoes to pineapples. The climate there is healthful and equable, the thermometer ranging the year around from 75 to 85° in the shade. There are two seasons only, the wet and the dry. The former commences about the first of May and continues until the latter part of October. The rains fall in heavy showers, and generally during afternoons.

The syndicate Mr. Robbins represents holds valuable concessions from the government, in order to encourage their large operations. Quite a number of foreigners are operating there extensively with improved machinery, but the majority of the mines are owned and worked by natives, whose processes are not so crude as they are small. Many of the companies are paying good dividends, but no definite results of the amounts produced annually can be learned. The archives of the country show that before it became a republic in 1821, the royalty of one-fifth of the production paid to the King of Spain aggregated up into billions of dollars. An immense and grand cathedral in Tegucigalpa was built entirely at the expense of a priest from the proceeds of a mine that he, individually, owned.

While the soil of the country is very productive and in many places excellent for grazing, the chief interest thus far is mining. The principal sections where this industry is carried on are Yora, Santa Barbara and Orlando, where gold, quartz ledges and placers predominate, and at Comayagua, Tegucigalpa and Paraiso are found gold, silver, copper and lead. The country is generally of a volcanic character, and ledges and veins of all sizes and richness are found.

The accommodations for traveling through the republic are poor, but Mr. Robbins says before long a railroad will be constructed from Puerto Cortez on the north coast to the bay of Fonseca on the south that will connect as closely as possible with the richest interior sections of the country through which it passes. He does not advise inconspicuous miners or other classes to go there at present, unless it be to enter a guaranteed position. All such, he says, are fortunate, for he believes the country has a great future. There is every indication of it.

Accidents From Machinery—Liability.

The master's obligation is not to supply the servant with absolutely safe machinery, or with any particular kind of machinery; but his obligation is to use ordinary and reasonable care not to subject the servant to extraordinary and unreasonable danger. When a master employs a servant to do a particular kind of work, with a particular kind of implements and machinery, the master does not agree that the implements and machinery are free from danger in their use, but he agrees that such implements and machinery, to be used by such servant, are sound, and fit for the purpose intended, so far as ordinary care and prudence can discover; * * * and the servant agrees that he will use such implements with care and prudence. If under such circumstances harm or injury come to the servant, it must be ranked among the accidents, the risk of

which the servant must be deemed to have assumed when he entered into such service. * * * As neither companies nor individuals are bound, as between themselves and their servants, to discard and throw away their implements or machinery, upon the discovery of every new invention which may be thought or claimed to be better than those they have in use, but if they take ordinary care and exercise ordinary prudence to keep their implements or machinery in sound repair, so that harm does not result to the servant for want of such sound condition of the implements or machinery used, then such individuals or companies will not be responsible to servants for any injury which may occur to them in the use of such implements and machinery.—*Lake Shore and N. S. Ry. Co. vs. McCormick*, 74 Ind. 445.

Sold For \$550,000.

The highest priced property ever sold at judicial sale of Lackawanna county was knocked down by Sheriff Lewis in Scranton to R. K. Dow, of New York, on Saturday, for \$550,000. The property sold was all of the coal lands and breakers of the Pennsylvania coal company, situated in Lackawanna township, on the west side of the Lackawanna river. The property was the fee simple of 395 acres, with breaker, coal mine and all necessary adjuncts to mine coal, and a leasehold interest in 500 acres of coal with two breakers and openings. The property was sold by virtue of two executions. One, a *vend. en. upon the judgment of the Second National bank of Wilkes-Barre vs. the Lackawanna and Susquehanna coal and iron company*, for \$3,434; the second, upon the judgment of R. D. Lacoe and others against the same, for \$3,228.75. These judgments were founded upon unpaid interest coupons on the bonds of the corporation. The preferred stockholders of the Pennsylvania anthracite coal company desired to prevent the sale of the property to the new breaker, which has been in course of construction during that time being completed. The stockholders, went to Scranton, and before the hour of sale Saturday morning, finding that the company did not pay the judgments, tendered to the execution creditors the full amount of their claims with interests and costs. The tender was refused. There is no more valuable coal property in the Lackawanna valley than that sold. At a low estimate it is worth \$1,250,000. So that the purchaser at \$550,000 will make a big thing if the courts hold that the sale wipes out the preferred stockholder's claim of \$890,000. The highest bid ever before complied with in Lackawanna county was the sale of the Pennsylvania anthracite coal company's lands on the east side of the Lackawanna river, when Randolph Crispin was sheriff. The sale at that time was for \$167,200.

The Lake Superior Iron Mines.

Lake navigation for the season of '85 is nearly over, and shipments of iron ore are practically all made for the season. Last year's shipments from the Lake Superior mines in Michigan, Wisconsin, and Minnesota were slightly in excess of 2,460,000 tons. This year they will reach 3,400,000 tons from the same district. Of this increase over last year's shipments the mines in the "Gogebic" district have contributed 500,000 tons and the remainder has been made up by mines in the Marquette, Menominee, and Vermillion Lake (Minn.) districts. The situation of the iron trade is much better than it was a year ago, and the mines have felt the improvement. The mining of an extra million tons of ore is no small job, and the increase has given employment to thousands of men who would otherwise have been working on short time or been without work. The product of the iron mines for the present year is 450,000 tons larger than that of '82, the year in which the largest output was made previous to '86. The product of the coming year will not be less than 4,000,000 tons, and may exceed that amount. The market is in a favorable condition and there is no danger of a glut. The iron fields of the Lake Superior region are of unexampled purity and extent. Were it necessary, in five years' time, the district could be prepared to furnish iron ore for the world. With the iron market in a healthy state, there is no danger of an overproduction of Lake Superior ore.

National Conference of Coal Miners.

A conference of coal miners from all districts in England, Scotland and Wales have been summoned to meet at Manchester on Nov. 22 and following days. Mr. Thomas Burt, M. P., will preside. The circular states that the conference has been called at the request of many districts to see if any thing can be done to better the general condition of the mining population. The vastness of the difficulties which surround such a subject are admitted, but one thing is clear beyond doubt, that without good, strong local organizations no good can be done. If this fact were not generally admitted, and made to operate as a general conference would be of far more use. The following, among other matters, will be considered:—The general condition of the mining population, socially, morally, and as regards organization; the mines bill, and whether a new bill should be drafted, or amendments be moved to the government bill, and whether a deputation should request an interview with the home secretary. The liability bill will come up for further consideration, with a view to discussing whether the conference should oppose contracting out of its operations, and whether the period for six weeks should be extended. Royalty rent and wayleaves will also come under the deliberation of the delegates.—*Wolverhampton (Eng.) Express*, Nov. 13.

IN THE SHAMOKIN FIELD.

Starting Up a New Breaker and Tearing Down an Old One. Other Operations Starting Up.

Officials of the Reading coal and iron company were in Shamokin last week looking over the property of the company in that neighborhood. It was decided to start up the new Henry Clay breaker Monday, and tear down the Big Mountain breaker. The work of demolishing the last named breaker has already commenced. The Big Mountain is the oldest breaker in the region. It was built upwards of thirty years ago by late Joseph Bird, who sold it to J. Langdon & Co. It was next operated by David Llewellyn, the late Edward Patterson, Reuben Fagley and Geo. O. Martz. Fagley and Martz finally retired from the combination and the works were operated by Patterson and Llewellyn until Jan. 1, '85, when the Philadelphia and Reading coal and iron company took it in hand and have since operated it. The years of its history were singularly unmarked by those direful calamities which are the bane of the coal mining business. Accidents there were, and fatal ones, too; but there were none of those wholesale slaughters of human beings ever and anon sent out of the mining region to horrify the civilized world. The management was made up of careful painstaking men, who in guarding their own interests did not neglect the safety of their employe. During the summer of '85 the stables attached to the works burned and about thirty miles added their fat as fodder to feed the flames.

Henry Clay colliery, which had been idle for nearly two years, was started up Monday morning, the new breaker which has been in course of construction during that time being completed. The structure is of iron and is one of the largest breakers in the region. In addition to the Henry Clay coal there will be prepared for market at this breaker the production of the Big Mountain, Peerless and Sterling mines. The breaker capacity is 1,500 wagons or 300 railroad car loads per day. It will require 1,500 men to keep it supplied to its full capacity, and the pay roll will amount to about \$2,500 a day or \$65,000 a month.

The improvements under way at Buck Ridge colliery are also being pushed to completion. This colliery and Greenback, which adjoins it, have both been idle for nearly two years and a half. They will be consolidated and put in operation probably by January 1. They will employ about 600 men and boys.

The new Langdon shaft, in West Shamokin, is also assuming shape. The breaker is near completion and it is expected that the colliery will be in full operation and employing several hundred hands by spring.

ENGLISH MINING NOTES.

From the "Midland Counties Express," Nov. 12.

The men employed at Gillfort Park mines, Egremont, West Cumberland, have struck work for a day of eight hours instead of ten.

At a largely-attended meeting of the Lanarkshire coalmasters, held at Glasgow, it was agreed to support in every way the proprietors of the coal pits at Wellshotts, Swinhill and Garraigh, whose men have struck for an advance of 6d. per day.

The sheriff of Fife on Thursday decided that the Fife and Clacknannan collieries committed a breach of contract by working only five days per week. The colliers have decided to resume the full working hours, but at the same time to demand 15 per cent. advance in wages.

At a meeting of the miners on strike at Collins Green colliery, St. Helens, it was stated that the proprietors, Messrs. Mercer and Company, declined to accede to the wishes or demands of the men to receive a deputation of strangers in the matter. The men, who have been out for six weeks, decided to continue the struggle.

A petition was filed in Hanley bankruptcy court on behalf of Hugh Henshall Williamson and William Shepherd Williamson, of Ramsdell and Congleton, respectively, and carrying on business as the Stonetrough colliery company at Scholar's Green, and the Brown Lees colliery, North Staffordshire, and also as the Goldeudale iron company, Goldenhill, North Staffordshire. The liabilities are said to exceed £50,000; assets not yet ascertained.

Pennsylvania Coal Company Shipments.

Following is the report of shipments of Pittston coal for the week ending Nov. 20, 1886:

Shipped East to tide.....	24,839-00
" " Local point on E. M. & Erie.....	4,944-14
" " West via L. S. & Erie.....	4,325-05
Total.....	34,106-19

There were numerous rumors in railroad circles this week affecting the Reading and its new management. One of them was to the effect that the position of general superintendent would eventually absorb that of general traffic manager, which latter position has been filled for the last fifteen years by J. Lawrence Bell. There were also intimations that a number of changes in the heads of departments would be made at an early day.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith. The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

Relating to Gas.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following questions in next issue:

1. Suppose you had a heading filled with gas, being 100 yards ahead of the air and that solid gas, how would you clear it out and your mine ventilated by furnace (and no dumb drift) to prevent ignition at the furnace?
2. What is necessary to render mines healthy and free from explosions?
3. What kind of safety lamp is best adapted for examining mines and what kind for working?
4. Why are they called safety lamps, and is there any danger in their use?
5. What causes natural ventilation, and can it be relied on at all times?
6. Where will the furnace give best results at top or bottom of a shaft and why?
7. In a mine generating large quantities of fire gas, what means would you employ to produce your ventilation and how would you distribute your air?
8. At what velocity would the air have to travel at in a drift six feet high and eight feet wide at the bottom and seven feet wide at the top to supply one hundred men with the least quantity of air required by law?
9. The water sump in a mine is circular and eighteen feet in diameter, and its depth is eighteen feet. The capacity of the pump in use is two cubic feet of water discharge for each revolution. How many revolutions will it require to empty the sump?

Yours, &c.,

T. B.

Phillipsburg, Pa., Nov. 15, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following questions:

1. Suppose you have three airways A B C, A is 2,000 ft. long, sectional area 6x5 ft.; B is 4,000 ft. long, sectional area 6x6 ft.; C is 2,000 ft. long, sectional area 5x5 ft., and the total quantity of air passing is 50,000 cubic feet. What is the quantity passing in each airway?
2. How much more resistance will a current of 600 ft. per minute meet with than 500 ft. per minute, the air course being the same, with a water gauge of .76? What will the water gauge be?
3. In driving a heading 200 fathoms long, how would you provide for ventilation?

Yours, &c.,

M. E.

Houtzdale, Pa., Nov. 18, '86.

Varying Formulae.

Editor Mining Herald and Colliery Engineer:

SIR:—Varying formulæ for estimating the ventilating pressure and motive column in furnace or up-cast shafts.

In a late issue two of your correspondents give a pressure of 33.952 lb. per square foot of section and motive column 431.45 ft., equal to a final velocity of 166.69 ft. per second. Would they kindly state by what means they convert 300 ft. vertical section of the exterior air at a temperature of 60 degs. in the zone formed by the different altitudes of two shafts, (one 1,000 ft. deep the other 700 ft. deep, reaching the same interior points, difference in depth due to starting point) to the same temperature of the interior air when escaping from the upcast after it has been raised by furnace action from 60 degs. until it reaches a temperature of 180 degs. Fahr? Also the amount of motive column, when the depth of shafts and temperatures are the same, and taking the surface altitudes of the pits as the same, the bottom of each being connected by an airway of corresponding area, having an inclination of 1 in 6 towards the upcast?

Yours truly,

Shanokin, Pa., Nov. 24, '86.

DEPUTY.

Colliery Managers.

Editor Mining Herald and Colliery Engineer:

SIR:—I have seen a great amount of correspondence on colliery managers, their duties, and how they ought to be trained—whether they should be trained in a mining engineering office, and go down the pit a few hours per day, for a few days in each week and then go before the board of examiners and receive their certificates of competency and

come out as fully qualified mining engineers and colliery managers, or whether they ought to be taken from the men who have worked in the mines from boyhood and risen from one stage to another in the mine, and educated themselves by their own industry, and appeared before the board of examiners and gained the certificates of competency.

I should say that the practical man is the man to manage our mines, both for the safety of the workmen and for the benefit of the owners. There is no doubt that the "lads" that mining engineers take into their offices are very clever in their way and that mining engineers are very obliging and nice to those parents that have clever "lads," with a good "premium," which is always acceptable, and learning them the arts and mysteries of mining engineering and colliery management, and then find them a situation at some colliery, not to manage but to mismanage it and to annoy any sensible man they may have to meet with.

Yours, &c.,

Shenandoah, Pa., Nov. 25, '86.

CERTIFICATE.

Engineering Question.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any of your readers oblige by answering the following question?

A 3 in. valve weighs 2½ lb., and acts 4½ in. from the fulcrum, while the pressure is five atmospheres, and the lever 21 in. long, weighing 6½ lb., required the weight that will just begin to act under these circumstances.

Yours truly,

A MINER.

Drifton, Pa., Nov. 23, '86.

Mueseler Safety Lamp.

Editor Mining Herald and Colliery Engineer:

SIR:—Kindly insert the following in your next issue:—1. What should be the height of the pipe or chimney? 2. The diameter at top and bottom? 3. How far above the top of the wick-pipe ought the chimney to be?

Yours, &c.,

D.

Drifton, Pa., Nov. 20, '86.

Outstroke.

Editor Mining Herald and Colliery Engineer:

SIR:—I will be much obliged if one of your correspondents will kindly let me know through your valuable journal the exact meaning of the word outstroke, often found in a mineral lease. If an outstroke clause is inserted in a lease, can two collieries be joined together so as to have a direct communication with the consent of the lessors?

Yours, &c.,

F. B.

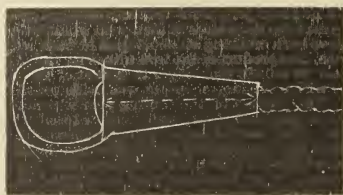
Pottsville, Pa., Nov. 24, '86.

Fastening Wire Ropes to Clasps.

Editor Mining Herald and Colliery Engineer.

SIR:—In answer to a correspondent on the above subject, it may interest him and others to know how the fastenings inquired about are made.

The following sketch and description explains



how this is done. Instead of a long wrought-iron clasp riveted to the rope as usually employed in England, we use a solid wrought-iron "cone" requiring no rivets. The small end is the same diameter as the rope, and the large end 1 in. greater. Half the wire is bent back, and then a store steel point is driven between the first at the larger end to expand them and make room for a filling of molten lead. The whole is made sufficiently warm so that the lead cannot be chilled without penetrating all interstices. The cone need not be longer than 12 in., and the operation can be performed quickly by men usually found at all collieries.

Yours respectfully,

J. H.

Phoenixville, Pa., Nov. 25, '86.

The supreme court of Pennsylvania decided on the 17th that the three-mill tax could not be collected from corporations. There were three appeals, those of John Hunter, John G. Adair and J. G. Barry, from the courts of Philadelphia. The plaintiffs were tax collectors in Philadelphia and were stopped from collecting taxes by a preliminary injunction. The lower court held that the three-mill tax does not hold against the mortgages, etc., held by corporations but does hold so far as individuals are concerned. This decision is confirmed in per curiam opinion of a dozen words by the supreme court. It will lose the state about \$150,000 a year.

AT THE MINES.

By the firing of several blasts in the new slope of Laurel Hill colliery, at Hazleton, Pa., on the 16th, an opening was made through which a large body of water found its way into the mines, partially flooding the same. The mules were taken out and an additional pump was placed in the same night. Work is expected to resume in the course of a few days.

On the 19th the large breaker of the Lehigh coal and navigation company at Nesquehoning, Pa., was completely destroyed by fire. Fully four hundred men and boys are employed at this mine and they will be thrown out of employment until the new breaker is completed, which will be in a few weeks. As this breaker was very old and was to have been abandoned, the loss, save the machinery, will not be felt by the company.

On the 18th the chain at the Hazleton mines slope, Hazleton, Pa., broke, letting two loaded cars back into the mines with lightning-like rapidity. The break occurred when the cars were near the mouth of the slope and in the descent the cars ran a little over half way to the bottom, a distance of 1,200 feet, knocking out some sixty props and causing the roof to fall in. The slope was almost choked with the fallen earth which continued falling for some time after the occurrence. Work was suspended and will be for some time until the damage is repaired.

The Erie breaker of the Hillside coal and iron company, Carbondale, Pa., was destroyed by fire on the 16th. There were seventeen men at work in the mine. One of them, a pump-runner, who was employed near the foot of the shaft, saw the sheaver wheel and flaming timbers from the lower fall upon the bottom of the carriage way. He alarmed the other men and the group escaped through the air shaft. The fire was first discovered in the tower. Its origin is not known. The loss is about \$80,000. Between 400 and 500 persons were employed in and about the mine.

About 8 o'clock, p. m., on the 18th, fire broke out in the boiler room of breaker No. 14 of the Pennsylvania coal company, situated at Port Blanchard, three miles from Wilkes-Barre, Pa. The breaker in which the coal taken from the mine is prepared for market is a vast wooden structure, 200 by 160 feet and over 100 feet high. As the fire burned through the sides of the breaker the coal stored inside fell in a torrent of living fire to the ground. The enormous building was totally destroyed together with a number of coal cars standing on the railroad near by. It was only built two years ago and was filled with the very best machinery. The total loss will be nearly \$100,000, partially insured. The breaker employs about 300 men and boys and the mine, which will also be thrown idle for some months, about 400.

On the 18th the Wyoming Valley, Pa., was swept by a destructive wind storm and a vast amount of damage done. The most serious disaster occurred at the Baltimore mines the Delaware and Hudson canal company. The new breaker at No. 2 Baltimore, now in process of construction, was blown down and heavy timbers hurled about like straws and carried over half a mile. Robert Johnson, a carpenter employed there, while making his escape was struck by a heavy timber and his skull smashed in. Death was instantaneous. The head house at No. 3 Baltimore was completely destroyed, and the roof of the breaker at No. 1 colliery swept off. Over 150 men and boys were in the breaker, and had it not been for the efforts of the superintendent, Ed. Mackin, a fatal panic would have followed. All escaped unhurt. The collieries will be idle for some time, and 600 men and boys will be out of work.

Wire rope of the same strength as new hemp rope will run on the same sized sheaves; but the greater the diameter of the sheaves, the longer it will wear. Short bends should be avoided, and the wear increases with the speed. The adhesion is the same as that of hemp rope. Wire ropes should not be coiled or unciled like hemp rope, but should be wound upon a reel. When substituting wire rope for hemp rope, it is well to allow for the former the same weight per foot which experience has approved of for the latter. As a general rule, one wire rope will outlast three hemp ropes. To guard against rust, stationary rope should be oiled once a year with linseed oil, or kept well painted or tarred. Running rope, while in use, requires no protection. Where great pliability is required, the centre or core of wire rope is made of hemp, and small-sized rope is generally made with hemp core. Running rope is made of fine wire, and standing rope of coarse wire. Wire rope from charcoal-made iron is fully one-fourth stronger than the ordinary rope. The standing rigging of a vessel, when composed of wire rope, is one-fourth less in weight than when of hemp.

The Grand Union hotel, New York city, has published a useful little memorandum book which will be mailed to any address on receipt of a 2c stamp.

Address, "Advertising Department,"

GRAND UNION HOTEL,
New York City.

Work in most of the Iowa mines is plenty. The chief difficulty is in making room for the men.

TOILERS IN FACTORIES.

A New York Inspector on Child Labor—Small Chances for Education.

"I've just got in from a ten days' trip through the country," said State Factory Inspector James Connolly to a reporter, "and I am now home to make up a report, which must be sent to the state bureau of labor statistics, and from the bureau it will be sent to the legislature."

"What part of the country have you been through?" the inspector was asked.

"Well," he replied, "I might say that I have been all over the state. During the summer and fall I have visited Cohoes, Little Falls, Schenectady, Amsterdam, Troy, Syracuse, Rochester, Buffalo, Herkimer, Hudson, Newburg, Yonkers and other places. I also visited the country about the above places and noted all that I saw."

"How are wages throughout the country?"

"As a rule they are fair, considering how wages are at present. In some of the factories women earn from seventy-five cents to \$1.50 per day, while experts get as high as \$2."

"How about wages of children?"

"Children earn from twenty-five up to fifty cents per day. Men get from \$1 to \$1.50. It may seem strange, but in some of the mills the women earn more than the men. In the knitting mills some of the girls can earn \$1.50 per day, and in some of the carpet factories the girls make as much as that."

"Did you find many cases of violation of the child labor law?"

"Yes; I found many children under the age of thirteen working in factories and mills throughout the state. I have three cases on in Buffalo now for violation of the law, and will institute twelve separate cases in a few days. I do not care to say where they are, for it might interfere with the prosecution. The punishment attached to the violation of the law is a fine of not less than \$50 or over \$100, or imprisonment not over ninety days or both. I intend to prosecute those cases thoroughly, for the employment of children under thirteen years of age is against the law and must be stopped. In some places I visited I found little children whom I am certain were not more than twelve years of age who would stand right up and state that they were fifteen and sixteen. The parents of the children were almost ready to swear that the children were over thirteen, and so no cases could be made out. The proprietors of the cotton mills at Cohoes own six hundred houses, and no family can live in the houses unless two members work in the mills. The parents do all they can to evade the law about children, and at one place I learned of a man who took a child out of an institution in Massachusetts, adopted it, and then put the little one at work in the mill."

"Does this frequently happen?"

"I can't say that it does, but in Cohoes among the French Canadians, the fathers let the women and children work in the mills while they stay at home, smoke, gossip and take life easy. They are a miserable lot of lazy devils and make their families support them. Some of the children they send to the mills are not ten years old."

"How are educational facilities?"

"Miserable. In Cohoes I believe that fifty per cent. of the children can neither read or write, and about seventy per cent. of the adults are as badly off. Almost as soon as children can walk they are put to work and have no time for learning. I found very few night schools, and no libraries or lecture rooms that the factory hands could use. The only place in contrast to the rest is the rubber works at College Point, L. I. The founder of the factory established a library for his hands and a reading room. It has been kept up ever since and is well patronized. Libraries and schools are greatly needed. I remember in one place that I asked a little girl why she did not attend school, and she replied, 'Why, sir, I can't get any one to go with me, and, besides, I must work in the mill.' Some system should be introduced for better education of those who have but little leisure time."

"Is there good protection for life and limb in the factories you have visited?"

"In some factories and mills the precautions are all that can be desired, while in others there is no protection at all; but they will have to be attended to."

"How do you find ventilation?"

"Ventilation throughout the country as a general rule is good, but in some factories it needs attending to badly."

"What impressed you most in all the factories and mills visited as the thing most needed?"

"Proper exits in case of fire. I know factories in this state in which, if a fire broke out, hundreds of men, women and children on the upper floors would be roasted to death. There would be no escape possible. They are nothing but human death traps, from which not one in a hundred could escape. Some factories have only a small narrow, wooden staircase leading up into the large workrooms, and, if a fire should break out I dread to think of the

consequences. Only a few factories have proper fire escapes."

"I suppose you have many suggestions to make to the legislature in regard to the factories?"

"Yes. Our report will be ready on November 30, and we shall recommend many improvements in regard to precautions to protect life and limb; ample means of escape in cases of fire, a strict enforcement of the child labor laws and on better ventilation and education."

"How were you received by the mill and factory owners?"

"I was received very well. The owners tried to conceal nothing from us, and all expressed a desire to comply with the law. I saw a great deal of misery while on my trips, but had no time or power to investigate how people lived or where they lived. I had to confine myself strictly to the factories and mills."—*New York Herald.*

IN COAL AND COKE.

Westmoreland county has fifty-seven soft coal mines, which last year produced 3,774,772 tons.

The rise in the Monongahela last week was not big enough to let out the coal. About 500,000 bushels were shipped.

Messrs. Schwartz & Oliver have nearly completed extensive improvements at the Greenwood breaker, near Tamaqua, Pa.

The New York and Westmoreland shaft, Manor station, Pa., after being idle for months, resumed operations yesterday.

A seam of coal was discovered in No. 1 tunnel of W. T. Carter & Co., at Beaver Meadow, Carbon county, Pa. It is believed to be three feet seven inches in thickness, has a pitch of twenty-five degrees and is of the best quality.

The introduction of natural gas in Johnstown, Pa., has led to the discharge of two-thirds of the coal miners employed in the mine from which the Cambria iron company drew its supply of coal.

Contractor R. F. Jones & company have begun driving a tunnel for the Susquehanna coal company shaft No. 1, at Nanticoke, Pa. The tunnel will run 1,000 feet, being fifteen feet in width and seven in height. It will be completed inside of eighteen months.

The relatives of the men who perished in the slope at Nanticoke, Pa., last December, don't want a monument. It is not believed the relatives are acting discreetly in this matter. There is a suspicion that they are just the least bit selfish about the matter.

The *American Manufacturer* follows up its natural gas supplement with one on coke, which is complete in itself. It contains maps of the different coke regions, statistics, coke trade history and scientific articles.

The Loyallhanna coke works at Latrobe, Pa., whose tipples and bins were destroyed by fire last June, is still idle. A Stutz coal crusher and washer will be put in and new hoists, bins and tipples erected. The works will not be ready to operate for several months yet. All the other works at Latrobe are running full.

The coke operators have definitely determined that no further advance of price is practicable in the present condition of the market. They find that Reynoldsville and West Virginia coke is already competing with them at the principal points and that an advance of price would injure their own trade instead of helping it.

The first contract of importance for anthracite to be delivered next year, so far reported, is that said to have been taken by the Lehigh Valley coal company, to supply the New York elevated railroad with 125,000 tons of broken coal at a price not much less than \$3.50 per ton. Last year's supply, about equal in quantity, was furnished the "L" road by the same company at \$3.04 per ton, while for this year \$3.14 was obtained.

In the "Pocahontas" (Southwestern Virginia) soft coal region 1000 additional coke ovens are in course of construction, and several new iron furnaces are soon to be built on the Cripple creek division of the Norfolk and Western railroad. When these improvements are completed, an official of that company says, "the imports of Alabama iron into Pennsylvania and New York will be supplanted by Virginia iron of equal if not superior quality and at cheaper prices."

The Lykens, Pa., *Register* says the Lykens Valley coal company are making arrangements to rebuild the Wiconisco, Pa., coal breaker and equip it with the most improved machinery and appliances for preparing coal and insuring the safety of employees. The same general plans have been laid out as were adopted last summer in rebuilding the Summit Branch breaker at Williamstown, and which proved a complete success. At least two months will be required to complete the work. Should nothing occur to prevent, the colliery will be run without interruption until the first of January, when the breaker will be dismantled and renewed with the shortest possible delay. Nothing will be left undone from now until the time fixed for the suspension to expedite the time necessary to put the breaker in running order again. But for the protracted idleness at Williamstown, the Wiconisco breaker would probably have been overhauled before this time.

Water Gas and Anthracite Culin.

The report of the Scranton board of trade on "Powdered Anthracite and Gas Fuel," to which we have already referred as a most valuable contribution to the discussion of the fuel question, has attracted considerable attention, the first edition of one thousand being nearly exhausted. The article on water gas has been the part of it that has been most widely copied and discussed. The immense piles of anthracite culm or dust that have accumulated at and near the mines have not only been an eyesore and an expense both for haulage at the dump and for surface upon which to dump, but they have represented an immeasurable amount of heat that it has been impossible, or at least believed to be impossible, to utilize to any considerable extent. Nevertheless, expedients have been devised, some of which have created a demand for a moderate amount of the culm, but the piles have grown in spite of these attempts to consume the culm. To use this dust in the manufacture of water gas is no new suggestion, but this report, coupled with the interest that has been aroused in gaseous fuel by the discovery and use of natural gas, has directed special attention to its use in this line. J. A. Price, the president of the Scranton board of trade, the author of the report, estimates the amount of culm produced since the opening of the anthracite region and now lying on the ground at 40,000,000 tons of which one-half, or 20,000,000 tons, has been wasted by the weather, used in filling and grading and fired in the culm bank, leaving 20,000,000 tons available. Estimating that a ton will produce 100,000 cubic feet of water gas this culm will produce 2,000,000,000,000 cubic feet of gas. The cost of the production of this cubic gas, as given by Mr. Price, is as follows:

One ton waste at producer.....	\$.50
Labor handling same per ton.....	.30
Expenses of plant per ton.....	1.00
100,000 cubic feet gas.....	\$1.80

or less than 2 cents per thousand cubic feet. This is certainly an astonishingly low figure, much below the usual estimates of the cost of water gas. Prof. Lowe, as stated in the report of the judges of the novelty exhibition, claims 80,000 cubic feet of gas from a ton of anthracite at a cost 10c. per 1,000. This would make the total cost of gas from a ton of coal \$8.00 instead of \$1.80. Of this \$1.80 50c. was for coal culm and \$1.30 for other expenses. Assuming that the expenses are the same when anthracite coal is used as when culm is used, the coal in Mr. Lowe's figures would cost \$6.70. The water gas will eventually play an important part as a fuel gas we have not the least question. That the best method for its production or that the gas now made is the best for some purposes, say iron-making, may be questioned. There are difficulties in its manufacture, there are objections to its use in furnaces in which it comes in contact with iron, but these will be overcome, and even now for many purposes water gas is much to be preferred to solid fuel.

The Burning Standard Mine.

The burning Standard mine has not yet been quenched, but the work is progressing satisfactorily. An effort will be made to confine the fire and operate the pit through the slope opening. A new air shaft is being sunk near Mellingtontown, at the north end of the plant, furthest away from the fire, and it is expected it will be completed by the expiration of the present month, thus giving the mine a second outlet as required by law, and establishing a perfect ventilation. Though work on this new air shaft was commenced but two weeks ago, it is making rapid progress. Tuesday a depth of nearly 60 feet was reached, an average of almost five feet per day. To accomplish this the men are being worked on three eight-hour turns in the shaft, which is in size 5 by 10 feet. The coal at this point underlies the fire, about 20 feet, and to reach it will require several more days' work. The rapid advance being made on this part of the work is all the more surprising when the fact is taken into consideration that the solid rock which the workmen met near the surface still continues.

Superintendent Dysart thinks work can be resumed by December 1st. Workmen have been busy during the past week repairing the roads and laying additional side tracks in the slope, as it is intended to run this portion of the mine night and day. By the miners working in two ten-hour turns from 400 to 500 wagons of coal can be hoisted at the slope alone, and thus about 300 ovens can be fired up. The ovens of the crusher block will be fired first in order to supply the crusher, which has been idle since the fire. The crusher at the Valley works was started a few days after the one here closed down, but its capacity is only about ten cars daily, and this does not fill more than half the orders coming in for crushed coke. While the repairs in the slope and work on the air shaft have been pushed with vigor, Engineer Craig, who came here to put out the fire in the old shaft, has not been idle. The cut-throughs are about completed. These are extensions of rooms Nos. 2 and 8, on the entry parallel to the shaft heading, and distant from it about 72 feet on the side next the slope. The rooms have been driven so nearly through the face of the coal as to be heated by the fire on the other side. Room No. 2 will open into the underground engine room, a distance from the bottom of the shaft of less than 100 feet, where it is supposed the central point of the fire is located, although nothing definite can be learned until the cut-through is completed.—*Connellsville Courier.*

MANUFACTURE OF COKE.

Criticising One of the Critics of a Fanciful Waste of Material.

John M. Fulton, with the Cambria iron company, writes to the *Engineering and Mining Journal* of last week as follows:

In the issue of the *Engineering and Mining Journal* of October 23d, an article under the above caption appears, by F. Koerner, E. M., which, as it is reinforced by the editor of this usually careful and reliable journal, is liable to mislead some one of its readers outside of the Connellsville coke region. The author of this article indicates that his special mission is to arrest "the enormous waste in our present way of producing the fuel." As the Connellsville region alone is mentioned, it is assumed that this criticism has exclusive reference to its mining and coking methods.

The opening charge is, that "we mine the coal, leaving from 30 to 40 per cent. of the seam in the mine as pillars and waste." The fact is, that since 1883 the chief mines in the Connellsville region have been worked on the panel plan; withdrawing pillars and making exhaustive mining. The loss of coal by waste in these mines will not exceed from 5 to 10 per cent. It is further alleged that the "coke ovens are bad, cheap copies of the ovens in use in Europe thirty or forty years ago." The waste of fixed carbon is given at "15 per cent. or more." Now, the actual loss of fixed carbon in coking in the Connellsville beehive coke ovens, under careful management, is 6.08 per cent.

Connellsville coke affords 59.61 per cent. of fixed carbon, and its coke 89.57 per cent. of the fixed carbon. Taking 10 tons of coal to make 1 ton of coke, then 15-10 tons, 39.61 = 95.27, less actual carbon in coke 89.57, exhibiting a loss in coking of 6.08 per cent. as above. The oven plants in the Connellsville region are placed in blocks of 100 coke ovens, 700 feet long. They are not stretched out 1400 feet long, as stated. The European plant of coke ovens, which is presented as the model of economy in saving labor, carbon, and reducing ash, is evidently some member of the Belgian oven family.

Rigid tests made in England last year, by I. Lowthian Bell, F. R. S., of the relative values of beehive and Simon Carves ovens coke for blast furnace coke, show that, while the latter produces a larger percentage of coke, yet the less product of the former affords equal if not greater calorific energy in the blast furnace. In other words, what is gained in the Belgian oven is lost in the blast furnace work. There is no explanation when these two typical methods of coking are considered. In the beehive oven the heat is applied inside the oven and in contact with the coking mass, producing the most thorough fusion and the hardest bodied coke possible for the coke used.

In the Belgian oven, the heat is applied through fire-brick walls affording a less intense heat than the beehive and thus a softer quality of coke. The thoroughly fused and hard-bodied coke of the beehive oven resists solution in the upper region of the blast furnace by carbonic acid, while the softer coke of the Belgian family of ovens is much more easily attacked by this acid, and a greater percentage of it dissolved before reaching the zone of its place of useful combustion. The small extra ash in beehive oven coke, in furnaces running on the "dry" iron ores of the northwest, goes over to the formation of slag, and is not altogether useless. The relative economy in the work of beehive and Belgian coke ovens is yet an unsettled matter. When the factors of original cost, relative output, labor, repairs, etc., are considered, it will be found that the difference in economy, if any, leans to the side of the beehive oven.

The Connellsville coke manufacturers when making a coke that, in blast furnace use, produces in a single stack from 1,300 to 1,500 tons of pig iron per week, with 1958 pounds of coke to 1 ton Bessemer pig iron, feel assured that the quality of their coke is beyond question excellent. They are also intelligently aware of the value of the ancient beehive coke oven for the production of the lost metallurgical fuel. The alarming estimates as the losses of fixed carbon, labor, etc., indulged in by the writer of the article under review have all disappeared, like the gaseous products of the coke ovens. We can only agree with the writer on one point, that it is "about time to call a halt" in arresting the "enormous waste" of estimated losses that have no foundation in fact.

MINE ACCIDENTS.

On the 17th, Thomas Sanford, aged 17 years, was killed by a boiler explosion at the Pratt mines, near Birmingham, Ala.

Jacob Lewis, a miner employed at the Stanton colliery, near Wilkes-Barre, Pa., was killed on the 17th by a falling piece of coal.

November 15, August Dingler, aged 40, was instantly killed at Camp Creek mine, near Massillon, Ohio, by a fall of coal.

There is a rush to the Austrian gold fields.

BUSINESS POINTS.

From the south there is reported an increased demand for anthracite, and the west is taking its share of that class of coal.

Natural gas has not killed the coal business in the Monongahela Valley by a long shot. The demands for coal lands is keen enough to satisfy holders.

Reports from all the iron manufacturing districts are to the effect that nearly all the idle furnaces are being prepared to go into blast and that many new ones are being built.

In prospecting for coal with the diamond drill, in Coal Basin, Garfield county, Colorado, natural gas was encountered in the bituminous shale that overlies the coal. This promises quantities of fire-damp in the coal mines.

The Pennsylvania railroad is constantly increasing its rolling stock for coal carrying purposes, and the other anthracite carriers are doing likewise, so that they may be prepared for next season's business.

For domestic use anthracite coal is rapidly displacing soft coal, coke and wood in the western states, and it is only the lack of transportation facilities, and, perhaps, enough self-feeding stoves, that have prevented an increased consumption of a million or two tons of anthracite there this year.

Park No. 1 colliery, formerly known as Bowman's in Schuylkill county, Pa., which has been undergoing extensive repairs for the past two years will be ready to resume December 1. This operation will give employment to about 250 men and boys.

COAL PROJECTS.

The Dickson manufacturing company, at the Wilkes-Barre works, are constructing a 320-horse power engine for the Melke Imperial colliery company, at Yokohama, Japan.

The new breaker at the Keystone colliery, near Wilkes-Barre, Pa., has been finished, and coal was prepared for the market on the 15th.

A new tunnel has just been finished to ventilate the Boston mines of the Delaware and Hudson canal company at Plymouth, Pa. The tunnel runs from the Baltimore seam to the Five-foot seam, is 8x12 feet in size and 150 feet long.

In the great Woodward colliery's two openings at Kingston, the Baltimore seam has been cut about 655 feet from the surface, and it showed five feet of coal. The Ross seam was found at a depth of 910 feet and measured 14 feet thick.

The average number of cars hoisted in the Nottingham shaft, at Plymouth, Pa., is about 940 each day. The depth of the shaft is 474 feet and it is claimed more coal is taken from this opening than any other in this region. Nearly 1,000 persons are employed at these workings.

The Lehigh Valley company is having a slope driven in the Five-foot seam at the Wyoming colliery, above Wilkes-Barre, Pa. The size is 6+12 feet and has been cut through about 800 feet. It is thought that the slope will be about 1,500 feet long and that the basin will be reached at that depth. A 30-foot ventilation fan is being constructed at the Henry colliery of this company. A new engine with a 30-inch cylinder and 48-inch stroke has been provided to operate the fan.

Anthracite Coal Tonnage.

Statement of anthracite coal tonnage for month of October, 1886, compared with the same period last year.

This statement includes the entire production of anthracite coal, excepting that consumed by employees, and for steam and heating purposes about the mines.

	OCTOBER, 1886.	OCTOBER, 1885.	DIFFERENCE.
Philad'a. & Read. R.R.	1,329,678 04	1,237,320 16	I 92,357 08
Lehigh Valley R.R.	666,243 16	700,733 06	D 34,489 10
Del. Lack. & W. R.R.	550,019 18	642,160 11	D 92,140 13
Del. & Hud. Canal Co.	372,764 19	387,376 05	D 14,611 15
Pennsylvania R.R.	356,237 07	341,195 00	I 15,042 07
Penn'a. Coal Co.	106,110 04	183,809 10	D 77,699 15
N.Y., L. E. & W. R.R.	71,123 16	69,570 10	I 1,553 06
Total,	3,512,177 15	3,562,166 07	D 49,988 12

	FOR YEAR 1886.	FOR YEAR 1885.	DIFFERENCE.
P. & R. Railroad	9,419,577 08	9,370,611 14	I 48,965 14
L. V. R. R.	4,990,203 19	4,217,843 06	I 772,360 13
Del. L'ck. & W. R.	4,165,280 02	4,070,652 10	I 94,627 12
D. & H. Canal Co.	2,867,099 17	2,598,791 19	I 268,317 18
Penn'a. Railroad	2,875,121 03	2,783,373 09	I 91,747 14
Penn. Coal Co.	1,140,675 17	1,195,957 12	D 55,281 15
N.Y., L. E. & W. R.	595,507 08	510,358 02	I 85,149 06
Total	26,047,375 14	25,347,588 12	I 699,787 02

The stock of coal on hand at tide-water shipping points, Oct. 31st, '86, was 440,962 tons; on Sept 30th, '86, 518,306 tons; decrease, 77,344 tons.

JOHN H. JONES.

Accountant.

Lehigh Valley Coal Tonnage.

The following tables give the shipments of coal over the Lehigh Valley railroad and branches, as reported from the forwarding office at Packerton, Pa., for the week ending Nov. 20, 1886:

Anthracite Coal Received and Forwarded

From PENNA. & N. Y. R. R.,	WEEK.	TOTAL
AND	Tons, Cwt.	Tons, Cwt.
WYOMING REGION.		
Sullivan and Erie Collieries	1,894 16	
Pleasant Valley do	806 19	30,351 14
West Pittston B'ch do	129 01	21,220 19
Del. & Hud. Canal Co.	58,385 02	173,205 12
All other Collieries	38,809 06	1,594,112 10
Lehigh Canal, Mauch Chunk		

Total	99,220 08	1,820,785 11
Same time last year	39,837 06	1,534,814 13
Increase	59,383 02	285,970 18

HAZLETON REGION		
For Rail	49,324 06	2,234,426 10
do to do S. H. & W. R. R.	1,481 12	64,307 14
Lehigh Canal, Mauch Chunk	882 17	21,465 14
Total	51,688 15	2,320,199 18
Same time last year	70,996 02	2,365,480 10
Increase	19,307 07	45,280 12

UPPER LEHIGH REGION		
For Rail		
Same time last year		
Increase		
Decrease		

BEAVER MEADOW REGION		
For Rail	19,369 17	765,867 02
do to do S. H. & W. R. R.		177,521 11
do Lehigh Canal, Mauch Chunk		1,152 00

Total	19,369 17	777,541 13
Same time last year	20,791 14	731,697 10
Increase	1,421 17	45,843 03
Decrease		

MAHANOY REGION		
For Rail	38,788 17	1,481,946 13
do Lehigh Canal, Mauch Chunk		1,206 09

Total	38,788 17	1,483,153 02
Same time last year	40,249 02	1,453,992 12
Increase	1,460 05	29,160 10
Decrease		

MAUCH CHUNK REGION		
For Rail		
Same time last year		
Increase		
Decrease		

TOTAL ANTHRACITE RECEIVED		
From Wyoming Region	99,220 08	1,820,785 11
do Hazleton do	51,688 15	2,320,199 18
do Upper Lehigh do		
do Beaver Meadow do	19,369 17	777,541 13
do Mahanoy do	38,788 17	1,483,153 02
do Mauch Chunk do		

Total	209,067 14	6,401,680 04
Same time last year	171,874 04	6,088,895 05
Increase	37,193 13	312,784 19
Decrease		

Forwarded East by Rail from		
Mauch Chunk	109,826 11	4,777,072 02
Same time last year	129,825 14	4,744,850 16
Increase		32,247 06
Decrease		

Distributed as Follows:

Local East of Mauch Chunk	2,197 06	91,553 16
Forwarded East use L. V. R. R.	3,215 01	147,280 15
Delivered to Furnaces and Mfg'g. Companies	16,684 12	778,136 18
Mfg'g. Works & Lehigh R. R.		83 19
Ironton R.R.	87 12	3,207 17
" Cat. & F. R. R.	221 16	6,062 16
" East Penn. R. R.	15 17	185 15
" Perkiomen R. R.	3,050 11	129,203 07
" Bethlehem Branch F. & R. R.	2,235 02	100,666 15
" Port Jervis R. R.	9,173 01	288,603 04
" New Jersey Division	36,556 03	1,821,261 13
" M. & E. Div. D. L. & W. R. R.	851 12	61,610 14
" Penn. R. R. Bel. Div.	35,432 18	1,344,322 06
" Central R. R.	105 06	4,912 18
" at and above Mauch Chunk for use L. V. R. R.	2,823 17	121,173 17
To P. & N. Y. R. R.	27,865 18	1,082,045 15
To Northern Central R. R.	807 02	35,144 02
Philadelphia & Reading R. R.	1,481 12	77,645 15
To S. H. & W. R. R.		
To I. & S. Div. C. R. R. at Packerton for use L. V. R. R.		319 10
To Individuals at Mauch Chunk		6,374 05
To do above do	146 19	36,469 18
To Lehigh Canal do	538 15	23,824 03
To Catawissa R. R.	882 17	
To Del. & Hud. Canal Co., Wilkes-Barre	58,385 02	173,205 12
To L. & B. R. R. at Lackawanna Junction	6,809 04	68,405 05
Total	209,067 17	6,407,680 04

Bituminous Coal Received.

From P. & N. Y. R. R.	13 18	2,716 06
do all other sources	1,238 02	40,737 06
Total	1,142 00	43,453 06
Total Anthracite	209,067 17	6,401,680 04
do Bituminous	1,142 00	43,453 06
Grand Total	210,209 17	6,445,133 10

COAL DELIVERED TO AND RECEIVED FROM P. & N. Y. R. R.

Delivered to them,		
From Wyoming Region	26,234 11	1,039,831 02
do Pleasant Valley do	1,002 19	28,351 14
do Beaver Meadow Region	381 02	2,237 06
do Mahanoy do	247 09	11,482 07
Total	27,865 18	1,082,045 15
Received from them,		
From Sullivan and Erie Region		1,894 16
do Pleasant Valley do	1,002 19	28,351 14
do West Pittston Branch,	129 00	21,220 19
Total	936 13	53,467 09
Total Anthracite Coal	28,801 18	1,135,513 04
do Bituminous do	13 18	2,716 06
Total delivered and received	28,815 16	1,138,229 04

Reports from Honduras are favorable.

ACCIDENTS IN MINES

HOW THEY OCCUR AND THEIR RAPIDLY INCREASING NUMBERS.

A British Commission's Good Work.

From "Transactions of the Mining Institute of Scotland."

(Continued from Page 403.)

Fire-damp.—The analysis of fire-damp issuing from coal shows only slight variations in the composition of two blower gases used by the commissioners in their experiments on safety lamps and coal dust.

	GARSWOOD HALL.		LLWYNPIA	
	From Holder	From pipe leading to Holder	From pipe from Holder	From pipe to Surface
Carbonic Acid	0.86	0.86	0.49	0.27
Air	12.64	8.91	53.00	3.71
Nitrogen	2.94	2.27	4.07	3.01
Marsh Gas	84.16	88.96	42.44	93.01

It consists mostly of marsh gas, carbonic acid and nitrogen, being present only in small proportions.

According to the law of transpiration, the gas which exudes first from the coal will contain a larger portion of marsh gas than the portion which comes off at a later period. The latter will contain a higher percentage of carbonic acid and nitrogen. The following analysis by J. W. Thomas in "Coal Mine Gases and Ventilation" of gas obtained by boring into the seam itself and gas exhausted from a lump of the same coal prove this:

	Gas obtained by boring a hole into the seam.	Gas exhausted in vacuum from a lump of coal.
Carbonic Acid	0.44	5.46
Marsh Gas	36.54	84.22
Oxygen	0.44	0.44
Nitrogen	3.02	9.88
	100.00	100.00

Gas which collects in old workings and which makes its appearance in consequence of a diminution of atmospheric pressure, or from falls in the waste, will probably have a different composition from the blower gas; it will contain more carbonic acid and nitrogen, and it will also probably be affected by chemical changes going on in the goaf. Gas from old workings, too, will generally enter the mine diluted with a considerable quantity of air, and the various stages between a mixture containing 2 per cent. of marsh gas, when a cap first appears distinctly on the flame, and an explosive mixture will be passed through so gradually that there is much more chance of the existence of a cap being observed than in the case of a mixture with almost pure marsh gas from a blower or from freshly cut coal. In the latter case, the explosive mixture will be so rapidly attained that the presence of gas, as indicated by a cap on the flame, may escape notice altogether. Gas like the last which gives little indication of its presence by a cap is called "sharp" or "silver" gas. That used by the commissioners at Garswood hall colliery was of this nature and a cap could only be attained by careful adjustment between the narrow limits of 2½ and 5 per cent. Reference to the analysis shows that this was almost pure marsh gas, while, on the other hand, that with which they experimented in South Wales contained a considerable quantity of air which had become mixed with it in entering their holder. With this gas they had no difficulty in observing changes on the cap produced by the addition of proportions of from 6 to 10 or 11 per cent. The gas from the strata was practically the same in the two collieries; but the difference in the amount of air with which it was diluted, made all the difference between the characteristics of sharp gas and the indications furnished by the kind of fire-damp more usually found in mines.

Ignition.—Sir Frederick Abel found, in his experiments at Garswood, that a current containing 3 per cent. of gas and traveling with a velocity of 100 feet per minute, produced an elongation of the naked flame of the Davy lamp; with 3½ per cent. a fine flickering flame was observed which lengthened as the gas increased to 3½ per cent.; with 3½ per cent. it became prolonged into a lambent flame which increased in size rapidly as gas was added up to 4½ per cent., when a general ignition of the mixture occurred.

With velocities of from 200 to 1000 feet per minute, currents containing 3½ per cent. of fire-damp were ignited, sometimes almost immediately, but occasionally not until the current had been passing the flame 5 to 10 seconds. In two or three instances a gas mixture containing only 3 per cent. of fire-damp

inflamed throughout, after the current had been passing some time. When discussing the action of dusts we will see to what this is attributed.

It appears then that a mixture of marsh gas and air which will produce an extremely faint cap, becomes by the addition of about 2½ per cent. of marsh gas converted into a mixture which will rapidly produce an explosion. The distance between the point of recognition and the point of peril is therefore very short indeed.

Escape of Gas from Coal.—Gas generally escapes from freshly cut coal quietly, but under conditions which have not been ascertained.

The pressure at which it may exist in the solid coal has been made the subject of many experiments. Mr. Lindsay Wood, one of the commissioners, experimented in the Northern colliery at depths varying from 125 to 211 fathoms. Holes were bored horizontally into the seam of different lengths up to 47 feet. The pressure of the gas exceeded 200 lbs. per square inch in many cases, and in one instance a pressure of 461 lbs. was registered.

With the view of gauging the pressure in another district, corresponding experiments were made in South Wales with the following results:

COLLIERY	Depth Fathoms	Length of Bore-hole.	Pressure per Square Inch.	Cubic feet of Gas per Hour.
Olynien, Abercarn	176	42 9/11	129	1.90
	247	27 10/11	430	0.91
	250	30 3/11	318	1.78
Harris Navigation,	283	30 3/11	150	0.90
	361	25 3/11	116	0.257
Merthyr Vale,	40	41 2/11	107	3.66
	50	49 3/11	230	0.902

There seems no well defined relation between depth and the pressure of the gas in the coal; nor yet between the pressure and the quantity of gas emitted. At any rate the tension of the gas increases rapidly as the distance from the face increases; and this variation of pressure with the distance from the face probably remains constant for a considerable time, so that the discharge from a given area of face will also be constant for some time. For the determining which immediate effect ceasing purpose to work the coal has on the amount of gas it throws into the air, the commissioners had observations made at Boldon colliery by Mr. Living with his indicator. It was found that during an interval between Friday and Monday, of sixty hours, there was hardly any appreciable difference in the amount of gas produced. When the section experimented on was working it gave off 75 cubic feet of gas per minute and on Sunday night it had fallen to 67 cubic feet per minute. Living found in the same colliery that 74 cubic feet of gas were given off from working face, while only 33 cubic feet were given off from a face of the same length which had been standing for 12 months.

The chief circumstances which seem capable of exerting any influence on the escape of gas from coal are variations of pressure due to the superimposed strata, and the effects of variation of pressure and temperature of the atmosphere.

[TO BE CONTINUED.]

Fuel Bricks From Coal Dust.

Briquettes, or fuel bricks from coal dust, are growing in favor and demand in Europe. Scotland has at last fallen into the ranks of briquette-making nations. One of the largest coal-mining and pig iron-making firms there are now erecting a plant with a capacity of 200 tons a day. In France and other continental nations the business is large and growing. Jules Chagotolia, of France, and Carlo Raggio, of Italy, have each increased their plants by one new one annually for the last six years, till now they have a yearly capacity of nearly 350,000 tons each. Other firms have also gone into the business largely. The business is likely to get a start in this country soon. Pittsburg parties analyzed a French briquette last week, and found it a fuel of rare purity and power. Here, where coal dust costs nothing, the profits of briquette-making for locomotives and shipment would be large.

If the average reader were to be asked to name that state of the Union which can show the longest railroad mileage, he would in all probability designate New York or Pennsylvania. But he would be mistaken. Of all the states, Illinois heads the list with 18,504 miles of railway, while far behind come Pennsylvania with 7767 miles, Iowa with 7503, New York with 7385 miles, and Ohio with 7327 miles. Texas comes next with 6587 miles. Of all others, Indiana and Michigan alone have over 5000 miles, while Wisconsin, Missouri, Kansas and Minnesota have over 4000, and Georgia and California have over 3000.

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We therefore request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

A Pittsburg coal man who has \$200,000 invested in West Virginia coal lands near Newburg will erect seventy-five coke ovens and develop his purchase.

AN ENGLISH COAL PIT.

Observations of a Visitor Therein—Some Interesting Points on Management.

A correspondent sends the following account of a visit to the Ladyshore colliery, in Lancashire, England, owned by Herbert Fletcher, which is open to inspection every Monday. The men employed by Mr. Fletcher work with naked lights—candles, and by means of packing all the waste places and allowing no goafs or gobs for the accumulation of explosive gases and supply a good ventilation throughout the workings, he believes greater safety can be secured. The visitor inspected the various appliances at the surface, such as the mechanical stoker which is so efficient that not a breath of smoke appears to issue from the chimney, the haulage from one pit to another by endless rope, the workshops, engine houses, screening apparatus and other contrivances which were of interest to the general public. Then he descended the quarter mine, along with Mr. Fletcher, the manager, Mr. Scott and other officials who are always glad to conduct different parties through the workings. Having proceeded some distance along the main road, the visitor proceeded up a steep incline, the dip of the mines being on an average 1 in 2½, which is a rarity in Lancashire, but may be seen to a great extent in the Staffordshire and other coal fields. Arrived at the face, Mr. Fletcher explained the principle he follows, which is to pack all the space he possibly can. He said about 25 per cent. of the packing is made in the mine. The collier gets up the drawing road for nine feet wide and two feet deep, for which he is paid 5s. per yard. Twenty-five per cent. of the space is left open for drawing and air-roads, and 50 per cent. has to be brought into the mine consisting principally of cinders returned by the consumers of the coal and cinders made about the colliery, all being sent down the pit in wagons. In fact, under the rule it is impossible for any waste places to be left open, because for every tub of coal sent up the pit three-quarters of a tub of ashes has to be sent down, and if there happens to be no packing the collier cannot send any coal. The reason the tubs are filled three parts full is so as to allow the tub of coal going down the steep incline to draw up the partly filled tub of dirt to the working places. The colliers all seem in favor of candles on account of the roof, contending that accidents would be far more numerous if the so-called safety lamps were used. A very interesting experiment was tried. Seven lamps were put into a place, and not as much light was given as with one candle. One collier on being questioned how much gas he had met with in that particular mine, said he had worked there for over 13 years, and had not seen as much gas as would singe a man's whiskers, in fact Mr. Fletcher has offered £100 to any man who finds as much gas as will do so. Mr. Fletcher does not say that his system would do for all mines, but for the mines he works, he contends that the accidents which would result with lamps would be far more numerous than by the present mode of lighting the workings. Some sharp discussions have arisen between Mr. Fletcher and the visitors, one of his points being that in deep mines outbursts of gas are not more liable to happen than in shallow mines. Instances were pointed out by the visitors to confirm the belief that outbursts of gas are more likely to occur in deep mines, but Mr. Fletcher said that in his experience it was not the case, the shafts which he was working being 270 and 370 yards respectively. Another question which arose between one of the firemen and a visitor was the mode of ventilating which is carried out at the colliery. It was urged that Mr. Fletcher should not feed the furnace by the return air, but that it should be fed with fresh air, and the dumb drift come out above the furnace so that the blaze reached four or five yards into it. The visitor contending that the return air might become impregnated with explosive matter collected in traveling through the workings, he asked fireman which method he would adopt if he had a colliery of his own, and the man said he would adopt Mr. Fletcher's method, viz., of feeding the furnace with the return air, and having a dumb drift over the furnace under the same conditions, because there was no danger of an explosion occurring.

We cannot too strongly urge upon our readers the necessity of subscribing for a family weekly newspaper of the first class—such, for instance, as the *Independent*, of New York. Were we obliged to select one publication for habitual and careful reading to the exclusion of all others, we should choose unhesitatingly the *Independent*. It is a newspaper magazine, and review, all in one. It is a religious, a literary, an educational, a story, an art, a scientific, an agricultural, a financial, and a political paper combined. It has 32 folio pages and 21 departments. No matter what a person's religion, politics or profession may be, no matter what the age, sex, or employment or condition may be, the *Independent* will prove a help, an instructor, an educator. Our readers can do no less than to send a postal for a free specimen copy, or for thirty cents the paper will be sent a month, enabling one to judge of its merits more critically. Its yearly subscription is \$3.00, or two years for \$5.00. Address, THE INDEPENDENT, 251 Broadway, New York City.

SOME PRESSURE TESTS.

Steam Gauge Springs.—How They are Used and Abused.

An opportunity was had last summer to witness some tests made to determine the accuracy of steam gauge springs. It came about in this way. An engine was not doing the work it was thought it should do, so to discover what was going on in the inner engine, an indicator was attached, which revealed the trouble at once, viz.: a lack of pressure. The cards were taken with the governor valve and throttle full open, and showed about sixty pounds initial pressure, while the "boiler pressure" was ninety-five.

The boiler pressure was shown by a steam gauge attached to steam pipe by a small brass cock. The indicator was connected to steam chest to see if the lack of pressure was due to contracted ports or faulty valve construction, but the pressure was but a trifle greater in the chest than in the cylinder. The indicator man now concluded the steam gauge to be incorrect. The engineer said the gauge was a good one and had been tested but a short time before and found to be O. K. The engineer proposed testing the indicator spring, which was done as follows: The indicator was taken off above the cock at the union, and taken to a pair of scales. A piece of quarter inch steel wire was placed against the bottom of piston and projected some two or three inches. The indicator was now placed on the scales, resting on the wire, and held in as nearly vertical position as possible. A card had been previously put on and the air line drawn. Weight was now applied to the indicator until the pencil had raised an inch; the weight was now found to be twenty pounds. The scales now were set at forty pounds and weight was applied to indicator till the beam raised, when a line was drawn on card; the card was placed on the same scales as when the air line to the one just drawn was found to be very nearly two inches, showing it to be a tolerably accurate forty pound spring.

The engineer admitted the accuracy of the spring but thought the piston leaked so badly that there was a counter pressure on top of piston, and was therefore an element of error. The indicator man now proposed testing the steam gauge, something after the style of testing cast iron specimens illustrated in the *American Machinist* some time ago, which was done the next day as follows: A small cylinder open at the top, with a hole in the side or the bottom to receive a flexible pipe (rubber hose) was placed on the same scales as when the test indicator spring. A nicely fitting piston, bored out on top to receive a pointed rod, was inserted in the cylinder on the scales. The rod was now placed in the piston and under a cross beam on top of scales. The steam gauge in question was placed in the steam pipe leading to cylinder. When everything was ready the scales were balanced with everything on except piston and rod. The piston had an area of just two inches. Steam was turned on and the scales, which were new and in good order, showed a weight of from 150 to 170 pounds. The gauge showed 80 pounds, which corresponded with the average weight shown on the scales. The stiff action of the scales was attributed to the friction of the piston in the cylinder, which was afterward proved to be correct. The area of the piston was reduced by bushing the cylinder to one inch area and the friction was lessened. The area was reduced to one-half inch area, and finally to one-fourth, when the scales worked quite freely and the actual pressure determined within two or three pounds.

The experiment was getting quite interesting now, the testing of the gauge was forgotten in trying to overcome the friction of the piston, so that the exact pressure could be told. It was proposed that a spring be placed on the piston for it to press against, instead of at right body. This was done but the result was no better. It was then proposed that the piston be revolved while the pressure was on. This was tried and every sign of friction had vanished; the scales working as freely as they would under any load, and to the surprise of everyone the scales showed just one-fourth the weight that the gauge did. The gauge, was correct, also the indicator beyond a doubt.

The atmosphere was fairly thick with various ideas concerning the tests, which were original with the ones who proposed them, and new to all who saw them made. The steam gauge was now taken back and placed in its usual place to the steam pipe, but did not show the same pressure that it did when taken down, by about twenty pounds. Here was something strange again, for the pressure was known to be as high when it was put on as when taken off. The pressure was allowed to fall in order to see if there could be any chance for mistake in the safety valve, (which was kept blowing, or nearly so, all the time) when to our surprise the gauge began to show an increased pressure.

These incidents were related to a boiler inspector soon after they occurred, who explained the whole business in a few words, saying that bent tubesteam gauges should not be detached without a syphon or other means of keeping the spring cool, something every one had heard over and over again, but in this case had been strangely forgotten by all. But

there is one thing which these tests has led me to believe, and that is, that the friction of an indicator piston is a very considerable amount and has a great deal to do with the distortion of cards, especially if taken at very high speeds. The indicator is susceptible of improvements inside as well as outside. If a rotary motion could be given to the piston without interfering with it otherwise a much more perfect card would be the result in the opinion of your obedient servant.—C. O. Sine, in *American Machinist*.

Accidents from Machinery.

There is one point, at least, in which the French are in advance of both England and the United States in shop management—that is, in the measures taken for the prevention of accidents from machinery in motion. In France, for years past, young and inexperienced persons have, by legislative enactment, been forbidden to assist in repairing or in adjusting the bands and straps of running machinery. In addition to this, the French have devised and put into practice numerous scientific and some simple, but very efficacious, means of guarding against danger even to those of riper years, who are entrusted with the management of such machinery. Why have we not copied or even excelled the French in these particular directions? The fact is that neither in factory regulations nor legislative enactments has there been any steps taken for preventing the employment of young apprentices or young persons in general from attending to belting, gearing or the cleaning of machinery in motion. Great indifference also exists in regard to the means employed for guarding employees and others against the danger while moving about in the presence of machinery. The consequences is that year after year much maiming and loss of life is reported from such causes, in the case of very young persons who have been employed in such dangerous work, which should never be trusted to any but careful and experienced adults.

Apropos to the above we quote from a mechanical cotemporary as follows: A mill filled with machinery driven at its highest rate of speed is not the safest place in the world. Certain belts and portions of the machinery have to be left exposed, but the most dangerous parts are generally boxed up. In spite of this, hardly a week passes that some operative does not lose a portion of his hand or arm. It is said that in a majority of instances these casualties result directly from carelessness. At times defective machinery injures somebody, but more frequently machinery which is in the best condition, though always dangerous, does the damage. On great trouble, manufacturers assert, is that the help, in spite of the warning posted, persist in cleaning machinery while it is in motion. The work can be more easily accomplished in this way, and commands and threats have no effect. The help complain that they are not allowed sufficient time for cleaning, but it is thought that that makes little difference.

The Sliding Scale System.

The results of an English committee's inquiry into the practical workings of the sliding scale system, though always dangerous, does the damage. On great trouble, manufacturers assert, is that the help, in spite of the warning posted, persist in cleaning machinery while it is in motion. The work can be more easily accomplished in this way, and commands and threats have no effect. The help complain that they are not allowed sufficient time for cleaning, but it is thought that that makes little difference.

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A Mountain of Iron.

Marble Hill, two miles from Phillipsburg, N. J., has been purchased by a number of Philadelphia capitalists from Henry Fulmer, of Easton, and a large force of men has been put at work digging ore. The character of this ore is a choice red oxide, analyzing in metallic iron from 55 to 70 per cent. The ore is of the Bessemer quality, and shows up in true vein form. A blast last week showed a vein twenty-three feet wide, and it is believed that this mine will be one of the largest developed in New Jersey. A monster engine is in course of erection, and larger machinery to increase the output to four thousand tons per month is being constructed. It is externally a mountain of iron, and all indications are that it is inexhaustible. The profits to the fortunate stockholders are likely to be large, as the cost of delivering the ore on the cars, on account of the nearness of the tracks of the Pennsylvania railroad, will be about one-half that of most of the mines in other parts of Warren county. The capital stock of the company is \$500,000.

WHAT STEAM HAS DONE.

In Forwarding Mechanical Progress It Has Been Also a Moral Power.

The books and papers of the day are full of reports of the great revelations in mechanics and industry which have been brought about, during the last century, by the introduction of steam. But steam has achieved victories in the moral as well as the physical world. In proof of this we note a few facts, which we compile from a contemporary:

In ancient times the invading conqueror generally carried away to his own country a large portion of the population of the land which he had overcome and made slaves. Why? Because he wanted to remove from his own people a part of the burden of toil. History is full of accounts of such performances. In fact, the process endured to our time, for the capture of negroes in Africa, and their deportation to this country to be sold as slaves, was simply another form of the old business. The slave trade merely supplied a demand for labor from people who wished to reduce their own labors. Now observe. The invention and general introduction of the steam engine ended this kind of thing forever, for it gave to man a servant far more tractable, more economical, more energetic, more tireless, than any human servants could possibly be. The effect upon the laborer, of this change, was to uplift him and give him dignity. Labor is no longer joined with slavery.

This is the century of the steam engine. The same century has witnessed the emancipation of the slaves in this country, and of the serfs in Russia. It will not close before the slaves will be freed in Cuba and Brazil. Then there will not be an involuntary bondsman in any civilized land on earth. That majestic fact, of vast importance to the toiling man everywhere, is due solely to the introduction of steam and the general advancement of mechanical invention due to the introduction of steam as a motive power. In the meantime, the general status of the laborer has been so much advanced that he is now for the first time in the history of the world counted as a great political and social power. The laboring man today is on top. That is a practical, even if it be a startling, fact.

Note this, also, as another result of the introduction of steam machinery: The laborer in civilized countries now earns more money than he ever before earned, and the things which he requires for his comfort and his pleasure cost less than at any former period since the creation. If workmen would only read history they would find much to induce them to greater contentment. There was not in the British Islands, 300 years ago, a dwelling house that would compare in comfort with any one of the tens of thousands of excellent homes owned in this country today by men who earn \$10 or \$12 a week. The poor man has them because machines have been invented to do the work which men used to do, and because these machines have capacity for production far beyond the unaided capacity of man.

Production of Electricity.

Electricity is making quite as rapid strides toward utilization as a motive power as steam was doing one hundred years ago. The great thing in electricity now being sought for is some means for developing it from burning coal, without the intervention of a steam engine or any other motor. Many experiments have been made and not a few devices have been contrived—one of these, by an English inventor, in which the electro motive force of a cell is given about 750 volt. This is, of course, much less than the theoretical electro motive power of a hydrogen and oxygen couple, and the remaining energy evolved by the combination appears to be developed in the form of heat at the surface of the oxygen plate, and serves to keep up the temperature of the apparatus. In the action of the battery the hydrogen, in passing through the inner tube, is, so to speak, filtered off from any gases with which it may be mixed, and the residual combustible gases, if any, when drawn off by the escape jet, can be utilized as fuel for the furnace. This is considered a very valuable feature, as it enables the battery to be worked with strong producer gas, consisting mainly of hydrogen and carbonic oxide, and to be arranged in a compact way, the spare heat left from heating the cells being available for working the producer. It is claimed that a ton of coke used in heating the battery, including the hydrogen producer, gives at least three times the electric energy produced by the same quantity of coke used in working a steam engine and dynamo.

With the statements of a Frenchman who passed through Pittsburg on Saturday evening that the company which he represents cleared \$400,000 last year on an investment of \$1,000,000 in Montana silver mines, the report that an other bonanza has been found in the famous Comstock lode, and that rich discoveries of the precious metals have been made recently in the Bie and Mono mining regions of California, while the Leadville district of Colorado was never doing better, the contagion of the mining fever which is said to have broken out in London on account of the lucky strokes which British investors have made in mines in different parts of the world, will hardly be needed to start a boom in mining speculations in the United States.



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-AT-

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COMMUNICATIONS.

All communications, whether relating to the Business or Editorial departments, should be addressed to J. S. KIRKWOOD & CO., East Coal Street, Shenandoah, Pa.

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FOR THE WEEK ENDING

SATURDAY, DECEMBER 4, 1886.

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BUSINESS PROSPECTS.

The same marked activity that has characterized the business situation during the past six months continues, with a slight tendency in a few branches of trade to still greater development, and in a few instances higher prices. The aggregate volume of home trade is not greatly in excess of that of last year, but the industrial situation is more active than at any time in the past five years. Speculation is active, and while products and manufactures have not greatly increased in price the confidence being re-established in securities indicate the likelihood of more business and better prices in the future. The treasury continues to take in gold and the currency is accordingly expanded, notwithstanding the balance of trade has been slightly against this country during the past four months.

From a purely trade standpoint the business outlook is brighter than usual, but there are political shadows that may possibly injure those prospects. Congress meets on Monday next. Already we hear of members who are going to cut down the tariff and do various other things with a view to making themselves more famous and the country more prosperous. It is unnecessary to state that a reopening of the tariff question at this time will not assist business, but the contrary. The Morrison-Carlisle element in congress, however, are determined that it shall be reopened and that a last attempt to establish free-trade shall be made. It is also reported that the president will in his coming message recommend tariff reduction, in which event the fight to make a step in that direction may be hot enough to scare investors and check the revival of business. The currency question also will occupy the attention of Congress for a time, and the legislation enacted bearing upon it is likely to affect the future of business quite as much as any tariff legislation at all likely to be passed. At the rate at which the three per cent. bonds are being called, the whole amount of these bonds outstanding is likely to be paid off within the next twelve months. A very large proportion of these bonds are held by the national banks as security for their circulation and when the bonds are called for redemption they find themselves under the necessity of either purchasing four and four-and-a-halves or surrendering their circulation. The administration is favorable to the enactment of some sort of legislation that will perpetuate not only the national banks but their function of issuing currency, and it is understood that some such measure will be attempted. In the event of the banks failing to secure such legislation as they deem expedient, it is not improbable that a number of them may simultaneously surrender their charters and currency and thereby temporarily at least contract the currency and injure the business of the country. One of the measures which it is understood will be proposed is a thirty-year long bond scheme which contemplates the conversion of the 4 1/2 per cents into 3 per cents to run until 1917. But as it is more than probable that the government will be entirely able to pay off the principal of the 4 1/2 per cents on or before the time they fall due, it is not likely that a proposition to extend time will meet with favor.

The iron and coal trades continue to be the most active of all industries. The demand for pig iron continues to increase and prices have advanced from \$1 to \$2 per ton. Most furnaces are crowded with orders and as the iron in most cases is needed for current consumption many of them are experiencing great difficulty in supplying customers. Between the scarcity of pig iron and coke several foundries in the west are reported to have been compelled to shut down whole or in part. Steel rails are equally active with prices about one dollar higher. The anthracite coal trade continues to be unusually active, stocks at shipping points are low and the demand brisk. Iron furnaces which use anthracite for fuel are running at full blast and anthracite as a domestic fuel is increasing in favor and demand at the west. The output for December is fixed at 2,500,000 tons, or 400,000 tons greater than the allotment for December of last year. As a matter of fact, however, fully 3,000,000 tons were mined in the last month of '85. The representatives of the trade held a meeting in New York on Monday last, and decided after some discussion not to advance prices this month. Prices now obtained are fair and will be adhered to during the winter. The sentiment also appears to be in favor of maintaining prices as nearly as possible in the spring and avoid the losses which during the past seven years have resulted from the policy of cutting heavily in the early months of the season. It is announced that

the Reading company will make no more of these sacrifices in order to raise money. On the whole the outlook for the trade is brighter than usual.

The bituminous trade has recently developed great improvement and prices are firmer. Producers and dealers are unusually active and preparations are being made for an increased output next year.

THERE is a boom about the once sylvan solitudes of Silverbrook, in Schuylkill county, Pa., consequent on the completion of the coal company's mammoth breaker and the opening up of coal preparation for market. The breaker is of immense size, long and wide at the base, built after the most approved fashion, contains the best of machinery and has a rated capacity of 200 railroad cars a day. The coal already discovered and proven is apparently inexhaustible. It is being worked on the stripping principle. The stripping will be about eighty yards wide and one and a half miles long. The clay covering is twelve feet deep at one end and sixteen at the other, while the seam of coal beneath is 80 feet thick. Deeper down is the Big seam sixteen feet in thickness and still deeper is the Wharton of the same thickness. The operation, though new, will in a short time give employment to 700 work people. When it is remembered that as late as two years ago Silverbrook was a mere hamlet almost unknown in industrial matters, the present condition of affairs is a striking evidence of what benefits accrue from capital backed by judgment and enterprise. It has transformed a distant wild into a thriving town, uncovered a large area of land in order to remove therefrom a valuable mineral, made a valueless waste become worth thousands of dollars to the acre, transformed an uninhabited wilderness into a busy hive of humanity.

SOME time ago we published an article on the fine coal deposits of Lehigh and vicinity, in Webster county, Iowa, and the special and successful efforts being made to develop and market the same. The region continues to attract general attention because of the advantages it offers business men with capital. While the mining of coal is not new there, in fact has been carried on for a score of years, railroad facilities have been such as not to encourage extensive operations in that line. Recent penetrations of the country by two first class lines has given a fresh impetus to mining affairs and things are booming. Over six hundred men will thus be employed in Lehigh this winter, while the outlook for the spring is favorable.

THE statement of the Philadelphia and Reading railroad and coal and iron companies for October shows: Gross receipts, \$5,746,699.46; gross expenses, \$3,472,387.35; profit for the month, \$1,275,302.11, a decrease of \$78,863 as compared with October, '85; profit for the year to date, \$9,622,441.23, a decrease of \$940,035 as compared with the same period of last year. It will be interesting to note whether Mr. Corbin's first month of absolute control of these properties will make a better showing. Much has been promised in the way of reform; it is to be hoped that something solid may be realized.

THE board of commissioners of the state geological survey have considered the report of State Geologist Lesley. The report will form a volume of five hundred pages and will be accompanied by an atlas of about twenty-five maps. It will be of great service to those interested in the development of the mineral resources of the state. The board will ask the legislature for an appropriation of \$90,000 to enable them to carry on the work for the next two years.

THE objection to the incandescent light in mines that it gave no indication of fire damp has been removed by placing two together, one a colored and the other a clear light. A mercury contact, subject to the pressure from diffusion in an unglazed porcelain pot, allows the clear light to burn in a good atmosphere, but lights the colored one in fire-damp.

THE people of the northwest fear a coal famine this winter, as the supply on hand is meagre and navigation is closed. They blame lake owners for the shortage, as they refused during the summer to carry coal at the low rates prevailing, preferring to sail without cargoes. There is a chance up there for some one to play the Pattison game of bluff,

AN examination for mine bosses will be held in the city hall, Pittsburg, Pa., January 11th, '87, to open at ten o'clock sharp. There promises to be a sharp competition among aspirants.

TERRIBLE MINE EXPLOSION.

TWELVE MEN FATALLY INJURED AND TWENTY OTHERS SERIOUSLY BURNED.

A Sad Scene of Agony and Dire Disaster—Awful Work at the Conyngham Shaft at Wilkes-Barre—Death Caused by Carelessness.

The Conyngham colliery of the Delaware and Hudson canal company, in the second ward of Wilkes-Barre, Pa., was the scene of a terrible explosion of mine gas on the 25th. While not as violent as many that have happened in this coal field, the occurrence was, by a set of singular circumstances, attended with frightful loss of life. Over forty men and boys were burned, and of these not less than ten or twelve will die, while many are badly cut and bruised. Of all injuries that can be sustained in a mine a burn by exploding gas is most dreaded by the miner. It seldom results in instant death, but nearly every case of a serious burn results fatally in the course of a few days.

The men most seriously burned and of whose recovery there is no hope are as follows:

Boyle, Cornelius, miner, 38 years, married, with large family.
Brundage, Christopher, laborer, 45, single.
Cannon, Condy, miner, 30; married, with several children.
Cannon, John, miner, 40 years, married, with large family.
Coulter, Richard, miner, 26, married, with several children.
Dougherty, John, laborer, 30, single.
Ferry, Daniel, miner, 30, married, large family.
Kerns, Edward, laborer, 27, single.
McCole, Dennis, miner, 40, single.
O'Brien, Michael, laborer, 30, single.
O'Brien, Thomas, miner, 30 years, married.
Sweeney, Hugh, laborer, 27, single.

The following are seriously injured, and while it is now believed that they may all recover, the treacherous nature of their injuries renders it impossible to tell the result:

Annear, Alfred, miner, 40.
Boyle, James K., laborer, 40.
Connigan, Michael, laborer, 43.
Corcoran, John, laborer, 27.
Dougherty, Patrick, miner, 40.
Evans, William, fire-boss, 35.
Friel, Hugh, door-boy.
Friel, Michael, door-boy.
Gallagher, Patrick, miner, 35.
Herron, Peter, laborer, 25.
Kelly, Patrick, laborer, 27.
McCabe, Patrick, miner, 40.
Mackie, John T., driver, 18.
Neal, Walter, door-boy, 18.
Scobie, Nicholas, miner, 35.
Sweeney, Barney, laborer, 25.
Sweeney, Frank, laborer, 22.
Toole, John, door-boy, 17.
Williams, Ernest, miner, 22.
Williams, William, fire-boss, 40.

Besides these a number of others were slightly injured, but were able to make their way home with some assistance from their friends.

The explosion occurred a few minutes after 7 o'clock, as the men were going to work. The colliery employs 200 men and boys, and about half of them had descended the shaft. The storm of the last two days had raised the water in the mine, so that it was thought probable that there would not be any work for the men employed in the lower lift. Instead of going to work, therefore, these men, to the number of about sixty, waited around at the foot of the shaft awaiting orders from the fire-bosses, who were in the office, close by the foot of the shaft, in consultation.

The men were scattered around in groups, their flaming lights illuminating the dark passages and gangways, when without the slightest warning, a tremendous explosion shook the mine and a sheet of flame rushed from an old and abandoned passage leading from the main gangway, close by the foot of the shaft. Like a flash of lightning the damage was done, and the unfortunate men were surrounded and wrapped in fire and flame, and hurled hither and thither by the violence of the explosion. The smoke, flame and dust rushed up the shaft and shot into the air overhanging the workings like a black pall. The inside superintendent, Daniel McDonald, who was on the surface, hastened to get together a force of explorers and, unmindful of the deadly black-damp, at once went down the shaft. The feeble glimmer of their safety-lamps brought to light a fearful scene.

All round the foot of the shaft and in the adjoining passages and gangways lay the blackened bodies of men half buried in dirt and debris. A few of the less injured were huddled together near the foot of the shaft awaiting succor, and the groans of the men suffering terrible agony from burns were awful to hear. The shock of the explosion was felt in the most distant part of the mine, though no damage was done except around the shaft. The work of getting the injured to the surface was at once commenced, and never was it more rapidly or better done. The outside foreman, John Bowers, took charge of the charred and suffering men as they

came to the surface, and had them taken into the engine-room, the floor of which was soon covered with human forms so blackened, scorched and mutilated as to be totally unrecognizable.

Mr. Bowers and his assistants, with blankets soaked in oil, wrapped up the writhing forms, and as fast as ambulances and wagons could be obtained they were sent home to the hospital and others to their homes. The engine-room, while this work was in progress, presented a sight to sicken the stoutest heart. The groans and shrieks of the suffering men were terrible. They cried aloud for water, but none dare be given them. Oil was poured down their parched throats, and the blankets in which they were wrapped kept saturated with the liquid. Outside the engine-room a scene of frantic grief had been enacted from the moment the disaster was known. Nearly all the men employed in the mine live in the immediate neighborhood.

When it was known that the colliery was blown up the whole population living around flocked to the works. The wives, daughters and mothers of the injured were all in the most terrible agony and suspense. They sought admission to the engine-room, but were held back lest they should interfere with the work of those attending the injured. In many cases sheer force had to be applied and the frantic women held at bay. But so rapidly was the work of caring for and removing the injured carried on that two hours after the accident every man had been brought out of the pit of death; wrapped up and taken away and the outside of the colliery resumed its wonted quiet appearance.

The cause of the disaster is one of the most flagrant cases of violation of orders and negligence ever known in the mine. The passage way in which the explosion took place was an abandoned gangway known as the West working. Whenever the water rose in the mine this gangway became filled with gas. This was well known, and the place was guarded with heavy doors and across them was a board with the word "Gas" in large letters. Notwithstanding this, Thomas O'Brien deliberately entered the passage with a naked light, and hardly had he passed the door when the gas ignited. He was terribly burned and paid for his rash act with his life.

Peter Herron, who is badly burned about the head, neck and hands, was visited at his home by a reporter. He was found with his head bending over a dish of oil with which the heavy bandages were soaked. He suffered much, but managed to give some account of what he had seen. "I was standing by the fire-boss' shanty with my chum and Cornelius Burke. We didn't expect to work because the water was too high and we were waiting orders to come up again. There must have been fifty or sixty men standing around, talking, laughing and smoking. We had no idea of danger. The colliery was a safe one. The first thing I knew I heard a rush like a big wind. In an instant our lights were out and at the same moment, with a terrible crash, everything seemed to be ablaze. I couldn't see anything but fire. I didn't know anything else until I found myself lying in a heap close against the shanty door under the bench. I could hear some one calling out and groaning. I didn't think at first that I was much hurt, and got up, but I couldn't see. Some one came up to me and got hold of me, and the next thing I knew I was in the engine-house. Yes, my head seems all afire now, but I guess I'll get through this time all right."

Similar stories were told by other men, and several told how they saw O'Brien go into the abandoned working, but before they had time to stop him the explosion occurred. The damage to the colliery was not very great, and it is believed that work can be resumed in a few days.

The colliery has a capacity of 700 tons per day, and employs about 400 men and boys inside and out.

COAL SCREENINGS.

The shipments of coal from Chicago for Jan. 1st to Oct. 30th, foot up \$3,896,433 tons.

Hanover, Leipzig, Magdeburg, Potsdam, and especially Berlin, are large buyers of Silesian coal. Nearly 400 coal miners are on a strike in the northern part of Colorado. Eleven mines are closed.

The business of the Sault St. Marie ship canal during 1885, included 894,991 tons of coal for Lake Superior ports.

Last year's consumption of anthracite coal in Chicago and its environs amounted to 823,000 tons, from January 1st to December 31st.

In 1876 Westphalia supplied Berlin with 2,500,000 centers and Upper Silesia supplied 12,600,000 centers of coal. In 1885 the proportions were 1,400,000 and 16,000,000 centers.

The aggregate receipts of anthracite coal in Chicago last year amounted to 1,355,000 tons, January and December included, while up to the first of November this year (10 months) 1,111,000 tons.

The Kohinoor No. 2 shaft, at Shenandoah, Pa., which was abandoned by Hecksher & Co. when the P. & R. Co. took hold of the colliery, is now heisting over 200 wagons per day which will yield about 75 railroad cars.

If a belt is disposed to run off, says a contemporary, we should never try to keep it on with a stick, but remember there is always a cause, and look at once for a remedy. If the cause is a crooked pulley, throw off a belt—the belt being crooked, poor looking, the belt being too tight for the work, or the shafts not parallel, throwing the pulley out of line. Usually the latter is the cause. Shafts are liable to get out of line, and machies are liable to get moved from their settings.

MINING NEWS.

The fluid of iron ore on the J. Shannon Boal farm in Carbon county, Pa., is panning out well. One of the veins is said to measure thirteen feet in the clear, solid ore.

A vein of fine magnetic iron ore has been discovered near Rohrerstown, Lancaster county, Pa. It has been analyzed and found to contain fifty per cent. of iron.

There is a scarcity of miners on the Monongahela river in Pennsylvania, and along the railroads. Quite a number of mines are not running full because they cannot get enough miners.

The Northumberland coal company is still prospecting for coal on the tract north of Mt. Carmel, Pa. One or two valuable seams have been cut, and if they turn out as expected two or three mines will be opened next spring.

A prospect shaft has been sunk at Kenney's station, on the Wilmington and Northern railroad, for iron ore, with favorable indications. The mining was done near a spot where quantities of copper ore were mined years ago.

An important coal discovery was made last week near the Union Pacific bridge in Omaha. Persons who were boring for natural gas struck a seam of bituminous coal seven feet thick at a depth of 511 feet. A stock company with plenty of capital is to be organized at once to work the deposit. Experts say the seam is practically inexhaustible.

Coxe Bros. & Co. are improving a tract owned by them three miles from Hopeville, Pa. A new colliery called the Green Mountain is located there and will be a very extensive plant. The seam pierced is large and is claimed to be equalled only in magnitude by the coal bed of the Shenandoah valley. Early next year a slope will be driven through to the basin.

George H. Anderson and company are making preparations for the development of the coal seam on their property at Bolivar, Westmoreland county, Pa., and the erection in the spring of 100 coke ovens. The tract, from which the fire clay now used in brick-making is taken, embraces several hundred acres underlain with a seam of coal. The coal has turned out 76 per cent. of coke, which showed when analyzed, 91 per cent. fixed carbon and six per cent. ash.

THE £500 prize offered by Ellis Lever, of England, for a miner's lamp which shall emit a good light, be portable and, above all, perfectly safe from explosion by gas—has not been awarded. A new attempt has been made to provide a perfect safety lamp and a substitute for gunpowder in shot firing by Miles Settle, managing partner at Darcy Lever colliery, near Bolton, England, at whose invitation a considerable number of persons interested in coal mining recently assembled to witness experiments with his safety lamp and water cartridge. The Settle safety lamp is an incandescent electric lamp attached to a float suspended in a glass globe, and surrounded with water. Fracture of the glass breaks the connection, and the lamp goes out. The lamp is asserted to be perfectly safe, except from wilful injury. It was shown of two sizes, large for main roads, powder magazines, etc., and portable of the weight and size of an ordinary miner's lamp, with a much brighter light. The experiments, it is stated, were successful in firing the water cartridge without flame when placed amid coal dust and gunpowder, and also in breaking the lamp without exploding the gas with which it was surrounded.

THE contract for the monster trestle for the Lehigh valley railway company to be built in the vicinity of South Chicago, Ill., has been awarded. The structure will cover a piece of land 100x900 feet, and will cost about \$100,000. There will be double tracks both on and below the trestle—about 3,300 or 3,400 feet of trackage. The cars will run by gravity over one feeding track, alongside the trestle to an inclined plane and from there they will be hauled up by a stationary engine and moved on the surface of the trestle by a cable system that is entirely new. After being unloaded the cars will return over the other track and thence to the second "feeder" below by gravity. The trestle will have a capacity of 600 tons in retail shutes for local business, 200 tons for transfer from rail to rail, and 20,000 tons in stocking pockets. Work is to begin at once and be finished in about sixty or seventy days.

A USEFUL alloy of aluminum and tin has been obtained by M. Bourbouze by melting together 100 parts of the former metal and 10 parts of the latter. This alloy is whiter than aluminum, and has a density of 2.85, a little greater than that of the pure metal, so that it is not too heavy to replace aluminum in instruments requiring great lightness of their parts. It is less affected by reagents, etc., than is aluminum, and also is more easily worked. Another of its merits is that it can be soldered as easily as brass without any special preparation.

A METHOD by which the immense deposits of iron sand which abound on the coast of New Zealand have been successfully utilized has lately been discovered at Auckland. The feature of the new process consists in uniting a quantity of scoria with the sand when put in the blast. This has the effect of preventing the iron from oxidizing, an obstacle that has heretofore never been successfully overcome in smelting-iron sand.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy, and personal reflections should be carefully avoided.

All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Concerning Boilers.

Editor Mining Herald and Colliery Engineer:

SIR:—In answer to "O. V.'s" questions on boilers I submit the following which you will kindly insert in your next issue:

1. Give the fittings required for a boiler?

The fittings required for a boiler is a front, grate, doors, anchor-bolts, buck-staves, safety-valves, try-cocks, blow-off cocks, steam gauge, glass water gauge, and brass feed and check valves.

2. What kind of a boiler do you consider best?

For stationary purposes the horizontal tubular is considered the best, as the heating surface of this boiler is very large and hence they are economizers of fuel. Boilers are made of various forms with a view to economy of fuel, strength, compactness, and durability. No one form, however, will ensure all of these advantages, for if we want the greatest possible strength the boiler should be nearly of a spherical form. But this is the worse form for the economizing of fuel, as the spherical will expose less heating surface than any other shape. Watts approved of the rectangular form.

3. What material is boilers made of?

Wrought iron, iron, steel and copper. The latter named is the best material to make boilers with as it is a better conductor of heat than iron, although its tenacity is not so great, yet when a copper boiler bursts it is only a tear, whereas when an iron boiler bursts it is often blown to pieces, destroying everything in the way. Thus the copper boiler doing less damage and is easily repaired. Of course, iron only cost $\frac{1}{2}$ that of copper, but when a copper boiler is done the metal will sell for $\frac{1}{2}$ its prime cost, and when the former is done it will not pay for its replacement.

4. What rule for calculating boiler power for engines?

For the size of boilers necessary to work a certain engine the following rule is used: For ten times the horse power of engine subtract its one-third part and the result will be the product of the diameter by the length. This for a 21-horse power engine:

$$21 \times 10 = 210$$

subtract one-third which is

$$70 \times 2 = 140$$

which is the diameter multiplied by the length. This size boiler could be 5 ft. by 18 ft.

5. What height of water should be in a boiler when working?

There should be 6 to 8 inches of water above the tubes.

6. What is meant by using steam expansively?

When the steam is not allowed to flow into the cylinder the full length of the stroke, or when the piston has traveled part of its length, the valve at entrance is shut to prevent more steam entering. This is called "cutting off" the steam. The piston, however, continues its motion, and as it is pressed forward the space occupied by the steam is always increasing and its pressure is always decreasing in proportion, until at length when the piston has reached the end of its stroke the steam occupies double of its original volume. Thus the steam shut into the cylinder acts on the piston by its own elastic and expansive force.

7. Give rule to find weight required on the safety valve of a boiler.

We will suppose the safety valve on a boiler is 4 inches diameter and the steam blow-off at 50 lbs.; and length of lever 36 inches, and fulcrum 4 inches long and, allowing lever and valve to weigh $\frac{1}{2}$ lbs. The rule to find the weight on safety valve would be as follows: $4^2 \times 7854 = 125664$ inches area of valve, $\times 50$ lbs. = $6283200 - 5 \cdot 5 = 6228200 \times 4 = 24912800 \div 36 = 692$ lbs. to be attached to end of lever.

Trusting the above information will help "O. V.," I am,

Yours, &c.,

R. F.

Lchigh, Iowa, Nov. 22, '86.

Varying Formula.

Editor Mining Herald and Colliery Engineer:

SIR:—It appears that some cannot comprehend why the depth of the upcast is used as a factor in this case, and imagine that the 300 ft. of additional column in the downcast is not taken into account. Inasmuch as the temperature and density of this top portion of the downcast are exactly the same as the temperature and density of the 300 ft. of exterior

air immediately above the upcast (although not enclosed by strata or brickwork), hence, the ventilation will be *nil* until the furnace is applied, but this 300 ft., or top portion of the downcast, will even then neither add to or diminish the ventilation when established, so long as the temperature of the exterior air on the top of the upcast corresponds with the temperature of the 300 ft. or top portion of the downcast. This being the case, as per question, it is therefore not necessary to take further notice of it, and proceed to take into consideration the zone which contains the 700 ft. or lower portion of the downcast as to its density, and the density of the 700 ft. of heated air after being increased from 60 degs. to 180 degs. by furnace action, in the same zone of atmospheric pressure—viz., mean pressure of 30 in. of mercury, which gives 53'6249 lb., and 43'5647 lb. per square foot of second as the density in each case, and their difference gives a ventilating pressure of 10'0702 lb. per square foot of section, and motive column (having the same density as the air in the downcast) of 131'453 ft., and final velocity of 92 ft. per second. And to show that these results are within proper limits, we will arrange matters so as to obtain the greatest possible results by applying the furnace to the bottom of the 1,000 ft. shaft, and make the 700 ft. shaft the downcast, all other things remaining the same, then the balance line of equal pressure and density must be drawn across the top of the deeper shaft, the exterior air filling up the gap of 300 ft. immediately above the top of the 700 ft. shaft, and as the temperature of this exterior air is the same as the temperature of the air in the two shafts, the balance will be perfect in this case, and the ventilation *nil* prior to furnace action, and will amount to a ventilating pressure of 14'386 lb. per square foot of section, equal to a motive column of 187'79 ft., and final velocity of 109'79 ft. per second, giving an increase in the ventilating pressure of 4'3158 lb. per square ft. of section, and 564 ft. in the motive column, or 243 $\frac{1}{2}$ ft. shorter than the motive column stated by two of your correspondents, when the heated column of air was only 700 ft.; and to show the absurdity of such a motive column as given by them—viz., 431'45 ft. If we take a pair of pits having a depth of 2,238 ft. in each case, and the mean pressure of mercurial column to indicate 30 in. at half this depth, and mean temperature of the shafts at 60 degs., and then to apply a furnace at the bottom of one of the shafts to increase its temperature to 180 degs., a motive column of 431'45 ft. might be established, thus showing the necessity of an increase in the heated air column of 1,598 ft. to attain the result.

Co-efficient of expansion $\frac{1}{17}$ instead of altering this to $\frac{1}{17.7}$, would not $\frac{1}{17}$ be more suitable to facilitate calculations both mentally and otherwise, and would cause less change from the factor so much used in mining text books.

Yours, &c.,

M.

Drifton, Pa., Nov. 30, '86.

Wants the Pressure.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any of your correspondents answer the following question:

If a two horse power produce 22,000 cubic feet of air per minute what will be the pounds pressure per square foot?

Yours, &c.,

LEARNER.

United, Pa., Nov. 26, '86.

Engineer Question.

Editor Mining Herald and Colliery Engineer:

SIR:—The question of "A Miner" may be solved by the following formula:

Let D equal length of lever or distance from fulcrum to point at which the weight is suspended; d , distance from fulcrum to centre of valve; c , distance from fulcrum to centre of gravity of lever; w , the weight in pounds; w , weight of valve in pounds; l , weight of lever in pounds; A , area of valve in square inches; P , pressure of steam in pounds per square inch. Then $A P d = D W + l c + w$; from which we obtain

$$W = \frac{A P d - (l c + w)}{D}$$

Applying the given data to this formula, and assuming c , which "A Miner" omits to give, to be 8 in., we find the weight to be 161'6 lb.

Yours truly,

LYONS.

Shamokin, Pa., Nov. 20, '86.

Varying Formula.

Editor Mining Herald and Colliery Engineer:

SIR:—Now as to that part of the formula which deals only with the expansion of the air—viz.,

$$\frac{T}{495 + T}$$

This is based on the fact that one cubic foot of air at 0 degs. Fahr. expands $\frac{1}{17}$ of its volume for every increase of 1 deg. in its temperature. Thus, in the example given, the increase is

$$\frac{180 - 60}{495 + 180} = \frac{1}{17.7}$$

that is, 459 cubic feet of air at 0 degs. occupy 639 cubic feet at a temperature of 180 degs. At 60 degs., the temperature of the downcast, the space occupied by the same quantity is

$$459 + 60 = 519 \text{ cubic feet,}$$

and this number deducted from 639 gives us the same fraction again—viz., $\frac{1}{17.7}$, as the increase of the volume of one cubic foot of downcast air by being heated by the furnace to 180 degs. This fraction multiplied by the depth of the upcast gives 131'45 as the motive column. (By adding the temperature of downcast instead of that of the upcast to 459 for the denominator, the result would be motive column of air of the same density as that in the upcast, and this multiplied by the weight of the upcast air would give the same answer in lbs. per square foot as multiplying 131'45 by the weight of the downcast air. But, as I have said, M is invariably expressed in feet of air of the same density as the air in the downcast.)

Now as to whether the depth of the downcast or of the upcast shaft should be taken.

Suppose in fig. 1, D to represent the downcast 1,000 ft. deep, and U the upcast 700 ft. the surface falling from D to U . Now it will be evident at a glance that the pressure of the air will be the same

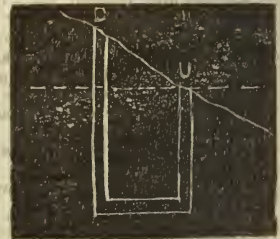


Fig. 1.

at a depth of 300 ft. in the downcast, as at the top of the upcast, as shown by the dotted line. Clearly then in this case the depth of the upcast should be taken. Suppose again that the surface is level and the seam rising from the downcast to the upcast as in fig. 2. In this case before the furnace is lighted

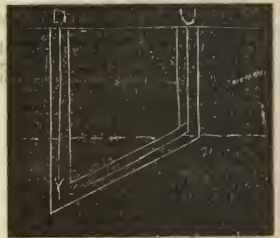


Fig. 2.

the atmosphere will be balanced at the bottom of the downcast as shown by the arrows, it will not rise to the bottom of the upcast, and there will be no current until the furnace is lighted. When the furnace is lighted it is at a vertical height 300 ft. above the bottom of the downcast, as shown by the dotted line; and there is only 700 ft. of air column for the fire to heat. When the temperature of the upcast has reached 180 degs., the air, as compared with the downcast, will be expanded from

$$700 \times 1 \text{ to } 700 \times 1\frac{1}{17.7}$$

—the difference being 131'45. If the motive column did not depend on the length of the upcast above the furnace, i. e., the length of the air column exposed to the action of the furnace—the fire would do as well at the top as at the bottom.

Yours, &c.,

J. H.

Wilkes-Barre, Pa., Dec. 1, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer.

SIR:—Please insert the following answers to "M. E."

1. Let q = quantity of air passing in each air-course, P = pressure per square foot of section, a = area of section, k = co-efficient of friction, s = square feet of rubbing surface, then

$$q = \left\{ \frac{Pa}{ks} \right\}^{\frac{1}{2}} 1000 a.$$

(See J. J. Atkinson on the general principles of ventilation, page 44.) Assuming P and k to be the same in each, the formula may be reduced

$$q = \sqrt{\frac{a}{s}} \times a \sqrt{a} = q \sqrt{s}, a^2 = q^2 s, q^2 = a^2 s,$$

therefore,

$$q = \sqrt{\frac{a^3}{s}};$$

this will give a comparative result, from which we can find the actual result. Their lengths are as 1, 2, and 1, therefore the rubbing surface is as the perimeters into these numbers,

$$\sqrt{\frac{81}{22}} = 35.032$$

comparative quantity in A air-course.

$$\sqrt{\frac{36}{48}} = 31.177$$

comparative quantity in B aircourse.

$$\sqrt{\frac{25}{20}} = 27.950$$

comparative quantity passing in C aircourse.

$$35.032 + 31.177 + 27.950 = 94.159$$

comparative total.

$$\frac{35.032 \times 50,000}{94.159} = 18602.5$$

cubic feet passing in A aircourse.

$$\frac{31.177 \times 50,000}{94.159} = 16555.5$$

cubic feet passing in B aircourse.

$$\frac{27.95 \times 50,000}{94.159} = 14842$$

cubic feet passing in C aircourse.

A aircourse will pass	18602.5	cubic feet.
B " " "	16555.5	" "
C " " "	14842.0	" "
Total	50000.0	

2. The resistance is as the square of the velocity while the aircourse remains the same, therefore if you increase the velocity from 500 ft. to 600 ft. per minute the resistance will be .3344 times greater, because as

$$500^2 : 600^2 :: .76 : 1.0944 \text{ in.}$$

height of water gauge.

3. If you were driving your mine say about 8 ft. wide by about 6 ft. high, a brick brattice would be sufficient for guiding the ventilation; it should be as close to the face of the mine as practice will allow. Generally two headings are driven parallel to each other, thus keeping a current of air at the face of the mine.

Yours respectfully,

A. C.

Birmingham, Ala., Nov. 29, '86.

The Area Given.

Editor Mining Herald and Colliery Engineer:

SIR:—In your issue of this date I see question given by "Young Colliery Manager" of Dunmore, Pa. The rule for solving this class of questions has been given in the HERALD some time ago, the area of the square aircourse is 137.87 feet nearly.

Yours, &c.,

S.

Wilksburg, Pa., Nov. 20, '86.

The Amounts of Air.

Editor Mining Herald and Colliery Engineer:

SIR:—I send solution of question No. 1 given by "M. E." of Houtzdale, in your issue of November 27th. In this question we may assume any pressure convenient; and by the formula calculate each airway, and then proportion that amount with the 50,000 cubic feet, which will give in the

A aircourse	18602.17	feet
B " "	16555.5	"
C " "	14842.80	"

Yours truly,

S.

Wilksburg, Pa., Nov. 29, '86.

FLOAT GOLD.

A Newly Patented Process For Its Recovery Where Now Much is Wasted.

The laws that regulate metallic solutions, suspensions and chemical combinations, if explained, point to certain phenomena highly interesting and important. These laws go to show that when precipitants are used to throw down a metal in solution, there is sufficient force left to form suspension compounds.

Research of modern investigations has proved in actual practice, guided by those theoretical considerations, the importance of the laws that lead to the solution of the float metal question. It is also now considered that solutions, suspensions and chemical combinations are manifestations of the same force and definite chemical compounds; such being the case, it is not difficult to arrive at some definite conclusions highly important to the chemical arts. This has already been done with results which promise to terminate the great wastage of the precious metal now floating away in many mining operations.

To effect this, some agent possessing a stronger attraction for the metals than water was required. This quality was found possessed in the hydrocarbons and also the saponified oleaginous bodies, the first has strong reducing properties; the latter highly basic. To render the matter clear for practical purposes, an example is cited which will also help to explain the principles involved.

Water carrying gold and silver in suspension is

deprived of its silicious and earthy matter as far as possible. A small quantity of any of the saponified oils or fats are allowed to mingle with it, which will coagulate. This decomposition causes a change of base; the metallic fatty matter separates and is taken up by passing the water containing the coagulum through a bath of the hydrocarbons or petroleum, which retains the metal, and is then refined in the ordinary way to obtain the gold and silver. There are in operation a number of filters placed at the tail end of jewelry factories, saving gold and silver that otherwise would have been lost; in these cases the saponified matter already exists and the mechanical arrangements are quite simple.

In conclusion it may be stated that this patented process has the following advantages: Gold and silver are withdrawn from water containing one per cent. in 25 gallons, which pays when in quantities, as the cost of manipulation is quite small; it also suggests that the great waste now going on in our large mining operations may be prevented, and much of our national wealth saved.

The above question has occupied the attention of mining metallurgists a long time, they have demonstrated by actual assay the heavy loss of float gold in our streams, while silver and quicksilver share the same fate. It must be borne in mind, in cases above cited, that quicksilver totally fails to act, while the new agent continues the operation by increase of force. Many of the hydrocarbons act far more energetically by withdrawing gold from its solutions than when precipitants are used.

Big Mountain Mystery.

There were a number of rumors flying about the streets this morning, no doubt arising from the fact that the work of tearing down the breaker at Big Mountain had been suspended, and orders issued that no more coal be taken away from the premises at the present time. One report was to the effect that the Reading company had shipped the framework of the old structure to Pottsville, but owing to the tangled condition of its affairs an injunction had been issued compelling them to suspend the work of destruction and restore the breaker to its former condition as a protection to the company's creditors. There is, however, so far as *Times* has been able to learn, no legal point involved in the suspension of work at Big Mountain. It is well known that the company management has for some time been discussing the advisability of leasing its mining property out to private individuals. It has been operated by the corporation, it is claimed, at a loss. There is scarcely reason to doubt that the new president of the Reading has been taking points of experienced operators. He has learned that a coal property that in former days yielded a handsome return on the investment, was being destroyed to make room for one a trifle more ornamental, a great deal larger and vastly more expensive. As a result of this information, tardy as it comes, all work has been suspended at Big Mountain, pending a thorough investigation by the new management. What the result will be no one can foresee. It may lead to the restoration of the individual operation in the anthracite region so far as the Reading property is concerned. If the company consults its own interests this will be the outcome. Private individuals have made and can still make fortunes out of property that is daily putting the Reading company deeper in debt.—*Shamokin, Pa., Times, Nov. 27.*

A New Use For the Draw-Shave.

A correspondent of the *Blacksmith and Wheelwright* recently visited a country blacksmith's shop, where he witnessed an entirely new process for "pointing" a piece of iron. The blacksmith, after his "heat" had reached its proper temperature in the forge, left it for an instant, while Vulcan laid an old saw and a draw-shave on a bench near the anvil; he then dipped a piece of woolen cloth in his water trough and fixed the cloth on the back of the saw with two bits of hoop iron that nipped it there, so that the water ran down on the blade. He then swung his "heat" out of the fire, placed it in the vise and clamped it securely in position, as he was working without a helper. He next took up the saw and with it cut about two inches off the woolen mass with a few rapid strokes, then snatched up the draw-shave and drew off white hot shavings to taper the end of the piece, only once pausing to dip the draw-shave in water, and turn the under side of the iron uppermost, and the draw-shave was flung into the water to cool. Now followed the rasp, this was nailed on to a staff or stake over three feet long, and the power thus gained to make the teeth of the rasp bite into the hot iron was manifest from the incessant showers of iron which flew off at every stroke. He remarked he was working both sides of his anvil, as his mate was away, meaning he had to do his work single handed. The use of the saw is common, but we have never seen an ordinary draw-shave used for paring down hot iron.

IMPORTANT.

When you visit or leave New York City save Baggage, Expressage and Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot.

613 Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators. Restaurant supplied with the best. Horse cars, stages and elevated railroad to all depots. Families can live better for 1/2 the money at the GRAND UNION HOTEL than at any other first-class hotel in the city. 21-ly

LABOR TOPICS.

K. of L. miners, some 7,000, in the Allegheny district, asked for an advance of wages. A conference will be held Dec. 4.

Still another bituminous pool is talked of which will rise in the river coal miners about Pittsburg, and yet another that will include the miners of Illinois and Ohio. In the meantime the trade in this class of fuel is contending against a daily increasing production which is affecting prices.

Some of the coal companies in the Wyoming, Pa., region have been put to considerable annoyance and loss by assuming responsibility for the pay of laborers who work for miners. The Kingston coal company will no longer be responsible for the pay of laborers, who work for miners, and will pay the miner only for all work done by such miner, and the laborer must look to his miner for his pay, and not to the company.

Placed side by side, the mills, glasshouses, refineries and blast furnaces of Pittsburg would cover a tract of land half a mile wide and fifteen miles long. The Edgar Thomson works and the five furnaces connected with it occupy one hundred acres of ground, and the six plants of the firm cover two hundred acres. The rolls used in these mills cover two acres and in all the mills the rolls would occupy twenty-five acres. The Carnegie plants employ twenty-one shifting engines and have about thirty-five miles of track and sidings.

The Delaware and Hudson canal company is framing a mammoth trestle to be erected between the new Mill Creek shaft in the Wyoming Valley, Pa., and the breaker of the slope. It will be over 2,500 feet long and a portion over 25 feet high. The Dickson manufacturing company is constructing the machinery to operate an endless rope for this trestling. The coal taken from this shaft will be prepared for market in the slope breaker. This company is also driving a slope in the Mill Creek in the Baltimore seam. It is over 755 feet long and goes into the basin.

At a convention of coke workers at Everson, Pa., last week, the threatened strike was deferred until the 25th of this month. The miners and laborers' association decided to act in conjunction with the Knights of Labor, and both organizations will meet in joint convention on a day to be set by J. H. Byrne, Master Workman of district assembly No. 11, and William Mullen, secretary of the miners and laborers' association. The local assemblies, or branches of the organizations, will elect one delegate to the joint convention, and this will give the miners and laborers' amalgamated association 34 delegates and the Knights of Labor 31. At this convention all the demands will be presented, and the delegates will decide whether further action shall be taken. If a strike results, both organizations will be working hand in hand.

For English Miners' Relief.

It will be noted with satisfaction by the miners of South Staffordshire and East Worcestershire, and no less by coal-owners and the public, that spirited attempt is being made to establish in the district a successful miners' permanent relief fund. The advisability of such a society being formed is admitted on all hands, seeing that it aims at superseding the thousand and one unsatisfactory arrangements at present existing at the pits. We do not say that all those arrangements and provision are inadequate, but most of them are and it is desirable that as far as possible, uniformity should exist. There is no reason why the Staffordshire district should not possess the advantages already possessed by other districts through the operation of a society, the advantages of which no man acquainted with mining life can doubt. In a flourishing society of this kind, one distinct requirement—at least such is the prevailing practice—is the countenance and support of coal owners and land-owners, and of men of position. The meeting on Friday last had the assistance of the Hon. P. Stanhope and Mr. B. Hingley (both local M. P.'s) and others interested in the movement, and we hope to record that at the next meeting the example set by such large coal-owners as Lords Durham, Chesterfield, Londonderry, Bute, Fitzwilliam, and others, will have been followed by Lord Dartmouth, the Marquis of Anglesey, Lord Dudley, and the other large coal-owners of the Midlands. With their co-operation, and that of those more intimately connected with the working of the collieries and the men employed therein, a society may be built up of such magnitude as shall be able to cope with all the distress caused by mining accidents. Some such movement is absolutely necessary in the interests of both employers and employed, in view of the legislative responsibility, which must occupy the attention of parliament early next session, and also in view of the bill of Sir Joseph W. Pease, which has for its object the legislation of the transfer of accident surpluses from trustees to the funds of such societies. All things considered, the present is an opportune time for the establishment of such a fund. Northumberland and Durham, Lancashire and Cheshire, South Wales and other places are excellent precedents. The first thing to do is to obtain the confidence of both employers and workmen; then success is almost assured. Arrangements—honorable to all parties, and alike beneficial—should be entered into, and friction and disagreements minimised, if not altogether abolished.—*Labor Tribune, England, November 20.*

THE FORMATION OF COAL.

An Address Delivered by Mr. John Hale at the Teachers' Institute at Scranton, Pa.

Specialty Reported for the MINING HERALD.

When we recall the trials and struggles which science in days gone by has suffered; when we realize that for a long time all her steps were over a path of thorns and that her votaries were the subject of anathema and were made to feel the stigma of ecclesiastical hatred, we wonder not that few studied her path—that the army of her defenders was small.

But at last the dark clouds that stood over our heads have vanished away and the age of intellectual night has closed and the sun of knowledge geologically shines brightly over the world.

Once sciences were announced only before learned men in academies and erudite conclaves, and wrote alone for themselves. But now she extends her hand to all the world and whoever that will, can sit at her path and learn of her.

In this question of coal formation we must take into consideration certain natural laws. First, we shall consider the law of gravitation, cohesion and affinity which exist in the vegetable as well as the animal kingdom. The specific gravity of the different kinds of coal differs as compared with other matter; and it is understood that pure distilled water is the base of all other material. Specific gravity is the comparative density of all the substances. One cubic foot of distilled water weighs 1000 ounces or 62½ pounds avoirdupois. Therefore water will be considered as 1, or 1000, gold 19.361, iron 7.768, limestone 3.150, marble 2.838, granite 2.704, quartz 2.660, shale 2.600, stone 2.520, grind stone 2.143, common soil 1.984, bricks 1.900, anthracite coal 1.436, Maryland coal 1.355, Scotch coal 0.441, New Castle coal 1.270, bituminous 1.270, charcoal 0.441: dry wood—ash 0.835, beech, 0.852, maple 0.750, pine 0.660, white pine 0.554, atmospheric air 0.0012.

And further we shall explain the chemical compositions of the different kinds of coal:

Sup.	Car.	Hyd.	Ox.	Nit.	Sul.	Ash.	Total
Anthracite.....	91.5	3.0	1.5	1.0	1.0	2.0	1000
N. Coal.....	89.0	4.0	2.5	1.0	1.0	2.5	1000
Bituminous.....	80.0	5.0	3.0	1.5	1.0	3.5	1000
Coal.....	80.0	6.0	3.0	1.5	1.0	4.5	1000
Lignite.....	56.0	5.0	25.0	1.5	2.0	10.5	1000
Peat.....	58.0	5.5	29.0	1.5	0.0	6.0	1000
Wood.....	50.0	6.0	41.5	1.0	0.0	1.5	1000

We shall further endeavor to explain the different formation of the strata's including the formation of coal.

An idea prevailed some time in the past that the earth was about six thousand years old, but we believe it to be a great deal older than that. When we trace back into history we find that the elements that constitute the earth were in a fluid or molten condition, and that a great many changes and revolutions have taken place. When it was? how far back into eternity? when the edict went forth that matter should be? These things we know not and we have no hope of reaching anything only an approximation.

All we know is that "in the beginning God created the heavens and the earth." This is the watchword of the scientist.

Rob him of this fundamental idea—God in creation—and the geologist is tossed to and fro like a ship without a compass, or religion without a deity. The history that we have is something like a history of nations as written in books. But yet we see that the earth has written her own history on the rocks of that thin external shell of the earth's crust. It is the province of geology to decipher the record which we find on rocks and in mines all over the world.

The name of the formation which we introduce is known by geologists as the "carboniferous" and is called the "coal measures." The coal beds are made up of different kinds of rocks and among them are the sandstone, shale, the fire clay and the limestone. The sandstone and shale has that bedded structure which shows that they have been deposited under water, and are divided into layers and lying one over another.

Those sandstones and shales are composed of sand and mud that have been washed off the surface of the ground by rain, then carried away by brooks and rivers until they reach the still water of the great sea or lakes, and remain there until the formation of the strata was completed.

Shales are composed of hard clay and can be readily split into thin parallel layers. From this deposited matter rock has been formed which was deposited in two different ways.

When this matter is light and finely divided it can be held in suspension in the water and thus carried along, but when coarse or heavy it can only be carried forward by being pushed along the bottom of brooks and rivers.

The first sediment makes the river muddy, and the second which is pushed along the bottom causes a peculiar sound which can be distinctly heard in large rivers. "Shales" have been formed of very

fine mud with a mixture of sand which was carried along in solution or suspension.

When the stream that conveyed the mixture entered the sea or large lakes the velocity was checked.

This matter did not settle to the bottom at once, but was brought forward very often to a long distance by the force of the velocity returning by the stream.

Layers in this strata are formed by intermittent rains and thereby cutting off the supply of sediment for a time which had been caused by the heavy rains and showers.

"Sandstones" which is formed of a mass of sand or quartz as it is termed by mineralogists. Quartz is a very hard substance and is not easily ground to a fine slate. Therefore its grains are large and coarse and also very heavy.

The material of which sandstone is formed cannot be moved in suspension, but as a rule it is moved or borne down by the currents along the bottom of the rivers; when this sandy matter is running it is pushed forward into the deep and still water.

Under this circumstance the velocity is checked and the sand is not conveyed to a great distance like the fine silt of which shale is formed, but it sinks to the bottom and then forms into large banks near the entrance of rivers. These rocks will show great regularity of bedding over large area which is the feature in the formation of shale rock.

If any one will try an experiment let them take a large tub or pail half full with water and sand and stir until the solution is completed. Then pour it into the gutter and in a very short time it will be seen that the strata formation is taking place at your very door yard, and that according to natural law. "Cross-joints" or seams which is often seen in the sandstone which undoubtedly is formed by the water continually running in one direction.

The conclusion which we arrive at is that the sandstone is composed of the coarsest and the largest part of the mud which enter into the composition of both shale and sandstone. Now comes to our notice the limestone. This is not formed in the same way as the "shale" and "sandstone." Limestone is largely composed of carbonate of lime, which is formed in the sea water to some extent.

There are certain small animalcules that live in the sea water, such as shell fish and corals which have the power of extracting this carbonate of lime from the sea from which they are building their stony dwellings in which they live, if their dwellings are not a part of their organism.

On the death of those animalcules their hardest parts are formed of pure carbonate of lime which falls to the bottom of the sea and accumulates in great masses. This is done through chemical changes and pressure which afterwards is converted into pure limestone as we now find it.

(To be Continued.)

Is it wise for the workmen—those who labor with their hands for wages—to make a party by themselves, and so array themselves in political opposition to the men to whom they look for employment? The employers of labor have not become such by accident. The great majority of them began life as poor boys. They have bettered their condition by industry, economy and good management. The same way by which they have progressed is still open. What can be gained by a political movement which recognizes and emphasizes a dividing line between the employers and the employed? In spite of all the fallacious doctrine held and preached by the extreme protectionists, wages are not fixed in the long run by legislation. They are fixed by the law of supply and demand, which is as sure as the law of gravitation. They certainly cannot be improved by political action which disturbs confidence and paralyzes enterprise.—*Boston Herald.*

The boating season on the Delaware & Hudson canal is practically closed, the company's officials at Honesdale having issued the last loading permit on the 25th inst., and the last boats running are now well on their way to tide water. The season opened earlier than usual, April 5, and will close at the latest customary limit. It has been a fortunate one in other respects, there having been no serious breaks in the canal or other delays to navigation. But the policy adopted by the company early in the season of increasing shipments by railroad rather than by canal, withdrew nearly 100 boats after navigation had fairly opened. The conditions have been so favorable this season, however, that the aggregate of coal delivered at tide water will not vary materially from last year's figures, and the boatmen having been able to make an increased number of trips, have earned more than for many years past.

In accordance with his promise Congressman Scott has equalized wages at Pennsylvania colliery, in Northumberland county, Pa., and a number of his 800 employees at this mine have received a 10 per cent. advance in wages. The Excelsior miners will continue their strike, operator Roberts persisting in his refusal to advance wages, State President Harris is trying to bring about an arbitration of the difficulties.

Something in the way of variety is desirable, for which reason one of the latest strikes has merit. It is not a strike of workmen this time, but a blow by the business men of Rochester at what they term the telephone monopoly in that city.

READING stock seems to be in good demand, notwithstanding this year's bad business. President Corbin and Alfred Sully are making an impression.

COAL DEVELOPMENTS.

Over ten million bushels of coal were disposed of in St. Clair county, Illinois, last year.

The monthly pay-roll of the miners at Decatur, Illinois, is over \$10,000.

A prominent coal operator of Scranton, W. T. Smith, has secured a competent surgeon to lecture to his miners on the method of procedure in the many emergencies that arise from mine accidents.

The Comstock mines are producing more bullion just now than for some time past, and we are even promised a dividend from one company, formerly famous for them, but which has for several years not paid.

It is stated that quicksilver has recently been found in New Mexico. So far California has been the only place in the United States where this metal has been mined. We shall look with interest at the progress of development in New Mexico.

The output of coal at the Parrish coal company's colliery, Wilkes-Barre, Pa., averages 500 tons a day. The company employs about 450 men and boys. At present a slope is being sunk to the Baltimore seam. Two thirds of the work is about done.

It is possible that a western soft coal pool will be formed to regulate the shipment and prices for bituminous coal originating or shipped west of the Alleghenies. On Saturday the principal bituminous coal operators in the Clearfield region met at the office of Berwind, White & Co. to receive the report of a committee of operators who represented that district at the pool meeting held on Wednesday, and to discuss the propriety of the Clearfield region operators joining the proposed pool.

The shipment of anthracite coal westward via the lakes is about ended for this season, and the coal going in that direction will hereafter be sent by railway. A dispatch from Boston says: "Many schooners engaged in the coal carrying trade to this port have been driven out of the trade by the Boston Towboat Company bringing round barges laden with coal. These barges when first proposed were laughed at, but it has proved very successful. In consequence of this the schooner people have organized and have determined boycott the towboat company."

ENGLISH MINING NEWS.

From the English "Labor Tribune," Nov. 20.

Fourteen hundred men are on the "unemployed fund" of the Durham miners' association, getting from 5s. to £1 each, according to circumstances.

At a largely-attended meeting of the Lanarkshire coalmasters, held in Glasgow, it was unanimously resolved to form an association for the regulation of wages and matters relative thereto.

A Scotch newspaper says that the burgh of Hamilton owns coal royalties so valuable that last year there was paid out of the fund £1,000 to the police funds, £1,000 to the cost of roads and bridges, and after paying other sums there was a balance in the bank of over £2,600 to the credit of the fund. Many burghs in England would be glad to have as profitable royalties.

It has been suggested that the workmen throughout the northern counties might be induced to contribute to the funds of the Newcastle infirmary, and that if circulars were issued to all the colliery managers they would be able on laying the case before the men, to obtain permission from the latter to deduct a penny per man from the fortnightly pay.

MINE ACCIDENTS.

William West was instantly killed by a fall of coal at the Sterling colliery, Shamokin, Pa., on the 24th ultimo.

A fall of roof rock occurred at No. 10 shaft of the Pennsylvania coal company at Pittston, Pa., on the 24th ult., by which Michael Burke was instantly crushed to death.

On Saturday morning, Nov. 27th, an explosion of powder occurred at the Forty Fort, Pa., colliery of the Wyoming Valley coal company, which resulted in the death of William Cosgrove, a driver boy, and the serious burning of three men.

The era of fuel gases, both natural and artificial, has become an established fact. The total displacement of coal at Pittsburgh for the year is calculated at 2,550,000 tons and there are 461 miles of iron-pipe gas mains entering Pittsburgh as built by the four companies that control that supply. The new forms of labor created by these works, and the increase of active work at the iron mills and gas works, give employment to more than the 3500 assumed to have been displaced in coal mining and coal handling in transportation, as also in the firing and cleaning of coal furnaces.

The state railway council of Germany has forbidden the employment of men in active service on the railroads beyond eight hours daily. This is a wise provision, and will no doubt be the means of preventing accidents. A great many disastrous smash-ups have occurred in this country because some overworked railroad employee neglected to turn a switch or display a signal. Where required to work twelve to fifteen hours a day accidents may be expected.

EXPLOSIONS IN COAL MINES.

An Important Review of the Causes Which Thus Destroy Human Lives.

It would appear probable from a perusal of "Explosion in Coal Mines," by W. N. and J. B. Atkinson, her Majesty's inspectors of mines, that mining engineers while defending themselves against the enemy fire-damp, have overlooked a still greater enemy coal dust, and it is shown that the measures taken to reduce the danger of fire-damp to a minimum directly increases the danger of coal dust, even if our coal mines had been altogether free from fire-damp, extensive explosions, according to the views of these gentlemen, would have been possible. The presence of fire-damp has caused the influence of coal dust in explosions to be obscured and hidden; it did not appear to our fathers necessary to look for any other cause of explosions than fire-damp, and only of recent years has the influence of coal dust been recognized, and this is owing more to the exertions of Mr. Galloway, formerly an inspector of mines, than to any other worker in this direction; indeed Mr. Galloway may claim to be the first person in this country who called attention to the enormous danger of coal dust. The book now under notice is based upon the experience gained in the northern coal field during the last 13 years, during that period five extensive explosions occurred in the county of Durham causing the loss of 330 lives. These explosions, which are concluded to have been dust explosions, are particularly described as well as an explosion at Whitehaven colliery, in Cumberland, which is stated to be the most extensive fire-damp explosion that had come under the writers' notice—this last explosion resulted in the loss of four lives. The investigations made after the explosions appear to have been much more minute than such investigations usually are, and neatly drawn plans render the result intelligible. A table is given of the number of fatal explosions in the counties of Durham, Northumberland and Cumberland since the year '73 and the resulting loss of life is divided between fire-damp and coal dust in the proportion of 30 to the former and 334 to the latter; the comparison of these figures may give some notion of what is the opinion of the Messrs. Atkinson is the relative importance of the two agents in explosions. It is impossible in a review to criticise the reasoning on which the conclusions arrived at are based, but the leading ideas may be shortly stated.

The explosions which are attributed to coal dust were quite unexpected, no accumulations of gas were known to exist in approaching quantity what would be necessary to cause the widespread destruction, nor were such accumulations considered possible; while in the fire-damp explosion at Whitehaven there was known to be a large volume of gas in the district where the explosion occurred, the only element wanting in this case was flame, which appears to have been supplied in the shape of a defective safety lamp. Then in the five dust explosions, further observations, made after the disasters, showed that when the explosions happened the victims had been under no alarm, while in the fire-damp explosion they were evidently alarmed and retreating before the explosion took place. Still more singular it appears that the explosions attributed to coal dust were coincident in four cases with the firing of shots, and the flames of these shots are assumed as the ignition point. In two of the four cases the shots had been ignited by an open light in the shape of an open safety lamp, the parts of which had been screwed together again after lighting the shot.

It would appear that if a series of disastrous explosions of such far reaching character as the Durham explosions can take place in a mine, and up to the very moment of the explosion every person therein is in a state of fancied security, and when after the explosion it is difficult, if not impossible, to account for the existence of gas in sufficient quantity to permeate the wide areas affected, that investigation is baffled; but if as the authors suppose coal dust and not fire-damp was the fatal agent then light appears, and the hope arises that if this be true we may expect to prevent the recurrence or limit the effects of these dreadful calamities.

The patient and judicial examination of the mines made by the Messrs. Atkinson after the explosions under circumstances that must often have been dangerous, reveal a series of facts the importance of which it is impossible to over-estimate, and which support the view that coal dust and not fire-damp was the dangerous element in the Durham explosions. They found that the roads containing least gas but most coal dust were those traversed by the explosious with greatest violence, while the return airways carrying off all the gas issuing from the mines, but free from coal dust, were undamaged; but even those roads—the haulage roads—were not equally affected, but in a most capricious manner. Many examples were noted of the sudden stop of force where it might have been expected to continue, and these cases are accounted for by the absence of coal dust. They found that the greatest violence was exerted on roads where before the explosion

coal dust of a particular character was probably present. The peculiarities of this dust are pointed out and the danger of firing shots where it exists is dwelt upon, as the shots need not be blown out to cause ignition of a cloud of this dust in the air. There was one fact clearly brought out in connection with the Oaks explosion, the most disastrous on record. A shot was fired at the moment of the explosion, the flame from which penetrated into an intake airroad near the downcast shaft. If the conclusion as to the origin of the explosion, Tudhoe and Usworth explosion stated in this book can be accepted, the origin of the Oaks explosion need not be far to seek.

Remedial measures are discussed, and a chapter on the conditions of mines leading to explosions requires careful study. In order to support the views they put forward, the authors furnish a table of explosions which have occurred in the north of England from the earliest times. Remarks are made on a few of these explosions in cases where special information has been available.—*Wigan Observer, Lancashire, England.*

*Explosions in Coal Mines, by W. N. and J. B. Atkinson, H. M. Inspectors of Mines, with numerous plans in colors.—Andrew Reid, Printing Court Buildings, Newcastle-on-Tyne.

The Alden Coal Company.

The Alden coal company is located in the southern part of the Wyoming coal field adjoining the Susquehanna coal company's mines at Nanticoke, Pa., on the opposite side of the valley, and nine miles from Wilkes-Barre, on a branch of the Central railroad of New Jersey. The company owns a valuable tract of about eight hundred acres. Since commencing improvements in the latter part of '81, the company has put in an extensive plant and now have a thoroughly equipped and first class operation, consisting of a tunnel, shaft and breaker. The tunnel is driven in the mountain on the south side of the valley sixteen hundred feet, cutting the Bennett, Twin and Ross seams at four, eight and sixteen hundred feet respectively. All these seams were found in good condition and yield a fine anthracite. The Bennett seam is five feet thick, the Twin seven and the Ross eight feet thick. The Red Ash seam is yet to be heard from, but there is every reason to suppose the latter to be the most valuable deposit of all. The general inclination of the strata is from thirteen to twenty degrees. A shaft 12x20 feet in size was also sunk to the Twin seam which is cut at a depth of 275 feet, and great trouble was had in passing through the quicksand. The second opening was thus established and the work of opening up the Bennett and Twin seams actively pushed. From the foot of the shaft a new tunnel, 8x12 feet in size, is now being driven towards the Red Ash seam. It is cut through almost 450 feet and is daily expected that the Ross seam will be driven through the Red Ash seam as rapidly as possible, and it is thought it will be penetrated about 1,000 feet from the foot of the shaft. This completed, the two lower seams will at once be developed. The new double-winged breaker, having a capacity of 1,000 tons per day, is located near the shaft and has all the latest improved machinery. The company has one of the best artesian wells located in the northern part of the state. It is down 175 feet, has a six inch bore-hole, and flows 44,000 gallons of water every twenty-four hours. The wells will soon be put down to a much greater depth. It supplies the water for the mines and all of the dwellings of the employees. This company employs 500 hands, and through its influence a flourishing mining town of 1,200 inhabitants has sprung up, containing a fine church and two schools, and a free reading room and hall.

Charles L. Abbott, the Chicago agent of the Columbus and Hocking Valley coal and iron company, said to a reporter that the statement in a New York dispatch that a combination had been formed between the four great coal-carrying railroads and the Hocking operators to restrict the output and advance the price of soft coal, had not a vestige of truth in it. The coal owners of Ohio had certainly formed a pool, but it didn't in anyway take in the railway companies. The price of Hocking coal at the mine would be advanced twenty cents which would make it \$3.20 a ton, or just double the cost of mining. The object of the operators in making the advance was simply to get a little more than cost for their coal. A special dispatch from Pittsburg on the same subject says: "The statement to the effect that there is to be an immediate advance of from 25 to 30 per cent. in bituminous coal is denied by the prominent operators in western Pennsylvania and Ohio. They had been trying for some time to raise the price from 10 to 10½ cents per ton, but had failed. A pool to advance rates was impossible in the present condition of trade."

The manufacture of 175 new eight wheel cars has been started at the shops in Reading, Pa., for the P. & R. company. Twelve men working on them can complete the job in about six weeks. These cars will not be an addition to the rolling stock of the road, because they take the place of 350 four-wheel iron cars which have been worn out and demolished. It is the intention of the company to get rid entirely of these iron coal cars. At one time there were nearly 2000 on the road, but they have been rapidly demolished until only a few are found in a coal train. They were built about thirty years ago and are very durable and strong, but it has been discovered that they are too light for a heavy train. They jump the track and are the cause of wrecks.

ANTHRACITE GAS.

Attracting Attention in all Directions—The Principal Features Thereof Repeated.

Anthracite culm gas is the fuel of the future. The report of the Scranton board of trade on "Powdered Anthracite and Gas Fuel," to which we have already referred as a most valuable contribution to the discussion of the fuel question has attracted considerable attention, the first edition of one thousand being nearly exhausted. The article on water gas has been the part of it that has been most widely copied and discussed. The immense piles of anthracite culm or dust that have accumulated at and near the mines have not only been an eyesore and an expense both for haulage at the dump and for the surface upon which to dump, but they have represented an immeasurable amount of heat that it has been impossible to utilize to any considerable extent. Nevertheless, expedients have been devised, some of which have created a demand for a moderate amount of the culm, but the piles have grown in spite of these attempts to consume the culm. To use this dust in the manufacture of water gas is no new suggestion, but this report, coupled with the interest that has been aroused in gas-eous fuel by the discovery and use of natural gas, has directed special attention to its use in this line. J. A. Price, the president of the Scranton board of trade, the author of the report, estimates the amount of culm produced since the opening of the anthracite region and now lying above ground at 40,000,000 tons, of which one-half, or 20,000,000 tons, has been wasted by the weather, used in filling and grading and fired in the culm bank, leaving 20,000,000 tons available. Estimating that a ton will produce 100,000 cubic feet of water gas this culm will produce 2,000,000,000 cubic feet of gas. The cost of the production of this gas, as given by Mr. Price, is as follows:

One ton waste at producer.....	\$.50
Labor handling same per ton.....	.. .30
Expenses of plant per ton.....	.. .100
100 000 cubic feet gas.....	\$1.80

or less than 2 cents per thousand cubic feet. This is certainly an astonishingly low figure, much below the usual estimates of the cost of water gas. Prof. Lowe, as stated in the report of the judges of the novelties exhibition, claims 80,000 cubic feet of gas from a ton of anthracite at a cost of 10c. per 1,000. This would make the total cost of the gas from a ton of coal \$8 instead of \$1.80. Of this \$1.80 fifty cents was for coal culm and \$1.30 for other expenses. Assuming that the expenses are the same when anthracite coal is used as when culm is used, the coal in Mr. Lowe's figures, would cost \$6.70. The water gas will eventually play an important part as a fuel gas we have not the least question. That the best method for its production or that the gas now made is the best for some purposes, say iron-making, may be questioned. There are difficulties in its manufacture, there are objections to its use in furnaces in which it comes in contact with iron, but these will be overcome, and even now for many purposes water gas is much to be preferred to solid fuel.

Wants Practical Answers.

My article in your issue of October 30th, calling on the bituminous mine inspectors for their practical knowledge without any "ifs," namely, "Did you ever see after-damp to be explosive? And did you ever see any that was not explosive?" remains unanswered by the inspectors. I hope, for the sake of practice, some of them will give us their experience, mainly since the committee of inspectors have declared to the state department that the question baffles the best mining talent, &c. I must say I have read some few works on mining, but never seen it in print that after-damp is explosive. I should think the inspector's committee (for the benefit of all practical, intelligent miners that read your paper) should with pleasure inform us who the authors are that claim "after-damp explosive." What I have seen of that inspector's report is not a frank expression on the question at issue, and it seems to me to put it exceedingly mild that the report was very much whitewashed. However, that is the general course of our country in its present age policy, polish and whitewash to accomplish ends and objects—whatever the case may require, I think I and others have a justifiable case for investigation by the next legislature. I have said time and again, through the public press, and also to the governor in writing, that the examining board was either fearfully ignorant or fearfully fraudulent. In this case I well know that we require the strong moral support and influence of the honest working people to accomplish the appointment of an investigation committee. I am satisfied there will be a strong influence brought to bear against such an investigation. However there can be no injustice done to the examining board, as they are in possession of our manuscript, and we have the printed slips (according to law) marked on the board. Solved right or wrong, as the case may be, intelligent miners can easily imagine what the decision is worth on many other questions at the same examination by this board when my per centage was lowered for answering "after-damp is not explosive." In my next I will give some practical hints as to how the bituminous ventilation law should be further amended.—*Augustus Stinner in National Labor Tribune.*

ACCIDENTS IN MINES

HOW THEY OCCUR AND THEIR RAPIDLY INCREASING NUMBERS.

A British Commission's Good Work.

From "Transactions of the Mining Institute of Scotland."
(Continued from Page 411.)

Mr. Hall, one of her majesty's inspectors, bored holes into the face of the coal; into these he tamped iron tubes in which he could, by withdrawing a piston, create a partial vacuum on the face. He found that the gas followed the piston almost as fast as it was pulled out, and only in one instance did his gauge show the slightest vacuum.

The escape of gas from coal due to the diminution of pressure in the air of the mine has lately been tested, on a large scale, at Karwin, in Austrian Silesia, where a partial exhaustion of a whole pit has been tried. With the downcast closed air-tight and the fan going, a water gauge of 2.36 inches was produced, but in consequence of a leakage from old workings the barometer only fell one-tenth of an inch below what it would have stood at had the downcast been open. The quantity of gas passing out of the mine was increased by 83 per cent. To get rid of the complication from the old workings a fresh trial was made on a section unconnected with any goaf, consisting only of an incline 203 yards long and an accompanying traveling road. The same reduction of pressure caused an increase of 40 per cent. in the output of gas. The shaft from which the leakage occurred was then closed, and a diminution of 0.15 inch in the barometer increased the quantity of gas to 2½ times its previous amount. These seem extraordinary results, and the commissioners find it difficult to reconcile the large increase of gas observed, with the fact that no equivalent increase was found when the barometer fell from natural causes, to the extent which had been artificially produced.

This diminution of pressure and consequent liberation of gas will be caused, as Mr. Hall has pointed out by a blown out shot in a narrow mine. If a second shot be fired (which emits flame) quickly after the first, it will probably ignite the gas liberated, and produce an explosion.

Sudden Outbursts.—These may come either from the coal itself or from the roof or floor.

Outbursts from the Coal.—The most remarkable outburst was that which occurred at L'Agrappe, near Mons, which forced its way against the air current, up the downcast shaft, and took fire in the engine house, and burnt as a column of flame from the mouth of the pit to the height of 110 feet for three hours.

The natural gas, which is estimated to be used to the extent of 28,000 cubic feet per minute in and around the city of Pittsburgh, and which is obtained from bores 200 fathoms deep, clearly shows that gas exists in the free state in the earth's crust.

Sudden outbursts in this country generally occur in soft coal. In one at Walker colliery, it is recorded, that on approaching a dyke a quantity of small coal, amounting to eleven tons, was violently projected into the workings, accompanied by a discharge of gas. In another, at Abercrombie, a heading having passed through a hard portion of the seam, approaching a region of softer coal, when a large mass was blown out and gas rushed into the workings with such force as to overthrow the men and tubs. It is estimated that it produced more than a million cubic feet of gas. Another occurred at Celynen whilst a roadway of nine feet wide was being driven. It took place so suddenly that one of the men working in the face was buried in the small coal, which to the extent of forty tons was projected into the drift. These soft parts of the seam are magazines of gas, clogged with small coal, and when the compact coal surrounding them is sufficiently thinned the pressure may burst it out, the gas carrying with it into the workings the small coal with which it is associated. Against irruptions of this kind no ventilation can cope, and the only preventive of disaster is efficient lamps and military discipline.

Outbursts from Roof and Floor.—These, it is now known, result to a considerable extent from the method of working. Thin seams of coal, shale, or porous stone lying under and over the working supply the gas at the high pressures which we have seen it attains in the solid coal, whilst the redistribution of pressure consequent on the removal of the seam effects its liberation. It has been noticed that these outbursts take place very often after a "weight," the gas issuing from a definite crack in the floor, generally near to and parallel with the working face.

If a seam have a certain thickness of pliable roof, and above that a strong rock, as the coal is removed

the pliable portion "sags," leaving an open space between itself and the rock, which if only a few inches in depth, will form a receptacle for a dangerous accumulation of gas. This will be forced into the workings when a break in the rock takes place. The commissioners state that they have reason to believe that some unexplained disasters have happened in this way. A condition of this kind is met either by very close packing or the introduction of a rise "gas drain" (as at Elbow Vale), formed by increasing the height of the rise roadway to the bottom of the hard stone which forms the roof of the cavity.

In exactly the same way we may have cavities formed under the workings by the removal of the coal taking the pressure of the superincumbent strata off the pavement and throwing it on the face of the solid; if there be a thin seam of coal, or porous strata of some kind, containing gas at high pressure, it will tend to liberate itself, and force upon the floor, and when the weight of the cover rests on the pack walls and stowing, it will be compressed to an enormous degree and burst out at the point of least resistance, which is generally along the wall face. The formation of these cavities will depend on the elasticity and adherence of the strata, and easy partings will evidently favor their occurrence.

If a cavity have the same area as the workings above or below it, and be but ¼ of an inch in height, it will contain sufficient gas, at the very moderate pressure of 300 lbs. per square inch, to bring the air in these workings to a highly explosive state, even supposing their height to be seven feet.

If the gas bearing stratum be near the working, the gas will break through before it has attained any great pressure; but if more distant, and the separating rock be strong, then violent outbursts may occur which no ventilation can dilute. Gas has been known to come from strata 50 feet below the workings. When it occurs at shallower depths, it is often relieved by bores, of which Silkstone Colliery, Norman-town, furnishes a good example. The seam there lies at a depth of 209 fathoms, and forms a working 4 feet 2 inches high. Below the seam, at a distance varying from 2 to 14 feet, lies an inferior coal split up by dirt partings. Bore holes are systematically put down to this seam for the purpose of draining off the gas.

The evidence of the manager of the Oaks colliery and others shows that the tendency to outbursts is considerably increased by working in large panels separated by pillars. The outbursts occur at the edge of the pillars when there is a sufficient area excavated for the pressure to again come on the floor and so force the gas out. At the Oaks it escapes into cavities from a stratum some 10 yards below the seam, in which bores have found a great deal of gas.

Special Methods for the Removal of Firedamp.—In Saxony the commissioners aver that up to 1879 it was recognized by authority as a regular system to suspend open lights, called "eternal lamps," in the higher parts of the workings to burn away the gas. They notice the process of Herr Koerner, of Freiburg, founded on the catalytic property of spongy platinum and palladium. With these metals he coated asbestos, and heating it over a petroleum lamp in rise workings got rid of the gas by slow combustion. Trials have shown that the effect was feeble or even nil. The commissioners state that they have had still more visionary proposals for the destruction of fire-damp submitted to their notice.

The damage done by pillar-and-room workings is irregular both as regards effect and time. It may commence, stop, and commence again. Houses are literally wrecked by it. So palpable is it, indeed, that actually the sound of the crushing and subsiding of the house can be distinctly heard. The slates are twisted off the roof, the chimneys hang in all directions, the walls are rent asunder, the foundations give way, and the house is rendered uninhabitable. An instance of this is to be found in the salt-workings of Cheshire, in the neighborhood of which, houses are constantly being wrecked. Thousands of pounds are paid every year by mine-owners for damages done to surface proprietors, farmers, and others; and there is no more fruitful source of litigation than surface damage.

Even under public roads, we find the minerals being worked. The public have only a right of passage, the minerals underneath belonging to the adjoining proprietor, and it is not an uncommon circumstance in mining districts for a road to suddenly sink several feet.

The case of a proprietor of minerals in lands adjoining the sea, is, as a general rule, extends only to high water mark. Below that line, underneath the foreshore and the sea itself, the minerals belong to the Crown. The Crown, of course, can lease the minerals, and they are very frequently worked under the sea itself. In such a case, great precautions have to be observed in the workings, to prevent any chance of the sea breaking in, though, when the stratum above is rock, the mineral is sometimes worked out within a very few feet of the bottom of the sea. In some mines, the roar of the ocean above can be distinctly heard.

This, however, is a digression from the subject of subsidence. Subsidence of the surface above our almost inexhaustible beds of coal has been going on, and will go on more or less, until that day in the dim futurity which has been foretold, when our coal seams will have become exhausted but when, let us hope, the inventive genius of posterity will have discovered another fuel or done away with the necessity of fuel altogether.

WHICH IS BEST?

The Mooted Question of Naked Lights Versus Lamps in Coal Mines.

Mr. Herbert Fletcher, the owner of the Lady-shore colliery, to which attention has been drawn by the recent arbitration case between Mr. Fletcher on behalf of his men and the secretary of state as to the use of naked lights, writes as follows: "Unexpectedly large numbers have responded to the public invitation to visit this colliery, amounting to 100 on the 4th October and 300 on the 11th October. To those who were interested in the arbitration it may be pointed out that since it began we have received newspaper accounts of four explosions in England and of one in Prussia, involving at least 111 deaths. Six only of these deaths occurred in a mine where open lights were used, and in this case—at Bristol,—though the coroner's jury found that 'the ventilation was adequate,' they added a recommendation that 'wind roads should be kept sufficiently large for a man to pass through easily in case of accident.' The first of the six explosions occurred at Ringley with the new Marsaut lamp, second at Bedford Leigh with the Davy, the third with open lights at Bristol, the fourth in Prussia with, we may presume, the Muesler; and the sixth at Norman-town, where the mine has relied exclusively on lamps—the bonneted Clanny—for the last six months. Those to whom the packing of the goaf appears new, and who inquire if it can be carried out in the neighborhood, are referred to the evidence given in the arbitration—that the mines are common to the neighborhood, that the system does not differ materially from that practiced in the neighborhood, and that, however, well carried out, it cannot affect materially the safety of the mines. The danger from the 'tenderness' of the roofs of these mines is shown by the fact that of the 605 cases sent to the doctor by the accident club during the last 13 years 252 arose from 'falls,' 346 from miscellaneous causes, of which the largest number were from slipping and falling down (due to the unusual steepness of the mines), and that there were five slight explosions, all of them on the old system of working with narrow work and unpacked goaves, injuring seven men. The only fatal accidents were 'falls,' and were four in number. Complete freedom from slight explosions is not claimed as the result of the solid packing, but only that the balance of safety from all kinds of accidents lies on the side of the present system of working. Slight and partial interruptions to the ventilation may occur, but the small quantities of gas which might then accumulate in the small holes and places where the system renders almost impossible the work being done on the roof are not likely to produce serious explosions or even serious injury to the careless person who should thrust an open light up into a hole in the roof where the air has become stagnant since the last trial of the place by firemen. One or two working places will be ignited by lamps—falsely called 'safety'—the visitors to the pit who are unfamiliar with mines may be able to appreciate the statement made by the men, and confirmed by the royal commission, that the best preventive of accidents is a good and handy light. And when visitors have observed the partial way in which the light is distributed by the lamps, the difficulty of seeing when up or down packed with a candle and a lump of clay, the inducement to work at a distance from the lamp which is created by this difficulty, and also by the fear of exposing it to damage during the withdrawal of timber under pressure from impending coal and roof, which is the most dangerous work in the mine and when, moreover they call to mind the proportion which the accidents from falls bears to those from explosion, spoken of above (252 to 7), they may cease to wonder at the collier's preference in such mines for the naked light, poor as it is, over the so-called safety lamps so lately stigmatized at Bedford Leigh as 'death traps.' When the visitors reflect that the authorities who compel the use of lamps do not suffer from the dangers from falls, of which dangers those lamps confessedly increase the probability, and that the lamps cause the expenditure on the air roads to appear less necessary, and also induce a feeling of lessened responsibility in those entrusted with the management of the ventilation, they may possibly take the opinion of those authorities with a grain of salt."

The Lehigh Valley railroad company is going to try a new switch and track crossing, invented May 11, 1886, by a Mr. Hoyt, a Chicago engineer. In order to give the invention a test one of the switches and crossings is being placed in the Valley yards at Bethlehem, Pa., connecting side track No. 1 with the lumber track. The advantage claimed for the patent is that it reduces the wear and tear on the tracks. The switch and frog are thrown together and thus a straight rail is given. The frog points and guard rails are also done away with, and the wear on the rails is reduced to a minimum. Mr. Hoyt is superintending the laying of the switch.

Work will soon begin in the new mines of the Chillicothe coal company, Missouri.

MINERAL SUBSIDENCE.

How It is Affecting English Proprietary Surface Rights—How to Avoid It.

The alarming subsidence which took place some time ago in Scotland, on the North British railway near Prestonpans, and which was fortunately unattended with any accident, has doubtless added a fresh source of fear to the nervous railway passenger. That the permanent way of a railway for a distance about fifty yards should suddenly sink to the extent of two feet is incomprehensible at first; and had this subsidence occurred whilst the train was passing, instead of immediately afterwards, the consequences might have been disastrous. It is the case, however, though it may be general known that subsidences—fortunately gradual, and comparatively inappreciable—are taking place over many of our railway lines, and that "mineral" are actually being extracted from underneath nearly every line of railway under which there is any mineral to get.

The damage done to the line at Prestonpans was reported to have been caused by coal workings which were there long before the railways were laid; but if it was caused by them at all, it was on account of their being influenced by the working of a seam of coal below them, which was going on at the time the subsidence occurred. It is the fact, however, that when a railway company acquires ground under its parliamentary powers, the minerals underneath the ground do not pass along with it. This may seem a little surprising at first; but it is not so when it is considered that very frequently the proprietor of the surface of the ground and the proprietor of the minerals underneath it are different persons. Of course the proprietor of an estate under no reservations, is as high as he can get and as deep as he cares to go; but he may sell or lease the minerals and retain the surface, or vice versa. Thus it is that a railway company has only, as it were, right of passage over the surface; and that its right goes no deeper, except for the construction or up-keep of its lines. By act of parliament, however, the proprietor of minerals below any railway line, before proceeding to work them, must give notice to the railway company of his intention to do so, so as to give the company an opportunity of buying him off, should it feel disposed. If it does not declare its option to purchase the minerals, the workings proceed, and the railway has to take its chance. The mineral will, however, be held liable, should any danger occur owing to improper workings.

The subsidence of a railway line underneath which the minerals have been worked is as a rule very gradual, and extends over some length of time. Many railway passengers must have noticed the walls of waiting rooms disfigured by ungainly cracks, the stone lintels displaced, the hearthstones awry, and many other signs, which are caused by the working of minerals underneath. Some station masters can show you on the stone face of the platform the number of inches the line has sunk. As a matter of fact, were it not for the gangs of surface-men the railway companies employed to watch any regularities in their way, in a very short space of time the permanent way would in many places probably represent something like the proposed line of the undulating railway, a fantastical scheme of long ago. The railway in Ayrshire which runs over the old workings of the famous Wishaw coal seam, especially suffers in the way of subsidence; and some parts of the railway in the west of Fifeshire known to have gradually sunk to an extent of over ten feet.

But railway lines are not the only parts of the surface which are subsiding owing to the workings of minerals. The whole surface of the land surrounding the many pits and mines which are continually being worked for their way, in a very short space of time the permanent way would in many places probably represent something like the proposed line of the undulating railway, a fantastical scheme of long ago. The railway in Ayrshire which runs over the old workings of the famous Wishaw coal seam, especially suffers in the way of subsidence; and some parts of the railway in the west of Fifeshire known to have gradually sunk to an extent of over ten feet.

There are two recognized methods of working out coal. The old method is what is known as the "stoop-and-room" or "pillar-and-room" system, and the method introduced into Scotland about the beginning of the present century is known as the "long-wall" or "Shropshire" system of working. The first system explains itself by its name. After the bed of coal is struck, "rooms" are worked out, leaving "pillars" or "stoops" to support the superincumbent strata. The object to be attained in this system, as practised in the olden times, was to have as large a room worked out, and as small a stoop or pillar of the coal itself left, as was consistent with the safety of the mine and the support of the surface while the mine was open. But this system entailed the entire loss of the pillars so left. To obviate this loss, the method now generally adopted is to drive

narrow rooms or passages, seldom exceeding fourteen feet, through the seam, leaving large pillars—about seventy-five per cent. of the mineral—until the extremity of the available coal is reached. When, however, no regards is to be had for the surface, and the coal has thus been worked out as far as can be done, the miner commences to work backwards, taking out the stoops or pillars as he goes. The whole roof of the mine then comes down; and this is the most dangerous kind of subsidence. It does not only take effect immediately above the place where "stooping" has been going on, but it also "draws" round about.

The "long-wall" or Shropshire method of working is what is known as the system of complete excavation; that is, the miner takes out the whole coal as he proceeds, leaving only perhaps a foot on the roof, should the overlying strata be soft, and props up a passage with wooden supports as he proceeds, to enable him to keep an open way to the face of the coal. The portions worked out are packed on each side of the "road" with the waste material taken out with the coal. This method of working, though it necessarily implies subsidence, is on the whole the safest for the surface, and is generally the one adopted. In fact, as mineral landlords are paid, in lieu of rent, a royalty or lordship on every ton of coal or other material brought to the surface, and as the tenant can more quickly extract the mineral by the wooden props method, he is generally bound in his lease to work in this manner, when practicable.

Should the coal be worked on the stoop-and-room system, and pillars of coal of sufficient size be left in, the surface will not be injured to any extent, at least not for many years. As is often the case, however, seams of coal are worked out one below the other, and when the lower ones give away, the pillars above may fall like a pack of cards. There is no saying where the subsidence would reach in such a case. If the pillars do not break, the way in which the "rooms" close up, if the floor is soft, is rather peculiar. The roof does not all fall in, as would be expected; but the enormous weight of the superincumbent strata pressing on the pillars causes the floor between them to rise up or "creep," and the room becomes closed. On the other hand, if the stoops of coal are taken out, the roof comes down with a crash, and the effects on the surface may be disastrous; but of course it sometimes pays better to get out all the coal and let the surface go, than to allow the workings to get closed up and the coal in the pillars to be lost for ever.

The subsidence following on a "long-wall" working is gradual, but the surface is not broken to any great extent, but comes down in one sheet, and not irregularly, as in stoop and room workings. The strata generally comes to rest in about three or four years. A row of houses which have been cracked through and through on the subsidence reaching the surface have been known to close up again when the strata have settled.

Atmospheric Conditions.—There can be no question that where gas is accumulated in old workings its dilatation, upon a reduction of atmospheric pressure, is liable to produce danger in a mine; but the gas will emerge before any fall in the mercurial barometer can be detected. The coal forms a very delicate air barometer. In collieries where the ventilation is maintained by powerful agents the fluctuations of the barometer are of little importance; but those in which feeble currents are sustained by natural means must be very seriously affected by atmospheric changes.

To the suggestion that warnings should be issued by the Meteorological office to colliery districts, the commissioners give no countenance, as they do not think any benefit would result from them and consider that their dissemination would give rise to an exaggerated idea of their value and lead to a remission of watchfulness.

They find that the absence of general connection between colliery explosions and barometric changes is proved by the fact that by some of the inspectors of mines, by the committee of England institute of engineers, and by Mr. Embleton.

A dangerous condition of a mine may be produced by a great variety of circumstances, of which probably atmospheric pressure is the one best understood and consequently least to be feared.

The commissioners think that a very large proportion of accidents are due to the sudden intrusion of gas in such moderate quantity as to be undervaluing the name of outburst, but nevertheless sufficient in the presence of coal dust, to be capable of giving rise to an explosion of the worst character.

They think it not impossible that earth shakes or tremors, which only indicate apparatus can reveal, may be a cause of the liberation of pent up gas, and that the observation of such tremors at stations distributed over the country might furnish useful information. Such a cause would, of course, account for the occurrence of a number of explosions close after one another at distant places.

In one case at least, the commissioners say, it has been suggested that an explosion was caused by lightning descending a shaft, but they are silent as to whether gas may be ignited by sparks from a hard stone, of which Mr. Sawyer gives an instance in the transactions of the north of England Institute, Vol. XXXIII.

Wm. H. McQuail, mine superintendent for the Alliance coal company, at New Philadelphia, Pa., has been selected as one of the persons to examine the new croton aqueduct in process of construction for the increase of the water supply of New York city, to determine what is necessary to increase the ventilation of the tunnels now being driven.

AFTER THE POOLS.

Attorney General Cassidy Takes the First Legal Steps—What Some of the Defendants Say.

The first legal step in the war on trunk line pools and corporation combinations was taken Friday by Attorney General Cassidy in obedience to the letter of Governor Pattison several weeks since. Judge Butler issued in the United States circuit court an order granting leave to bring suits in the court of common pleas of Dauphin county against the receivers of the Philadelphia and Reading railroad company and other railroads concerned for the purpose of testing the legality of the trunk line pool, and to enjoin the defendants from acting under such agreement.

A petition asking leave to bring suit against the Reading railroad and coal and iron companies to test the validity of the anthracite pool was also granted. There is much interest in the move of Mr. Cassidy among railroad men and coal operators and his long silence led many to believe that the matter would be dropped.

The suits, it is believed, will be pressed with all possible speed, it being the determination of the governor and the attorney general to bring them to a conclusion before Governor Pattison's term expires in January. To this end the prerogative of the commonwealth to have its suit put at the head of the list will be enforced, and Mr. Cassidy will use all his influence with the court to prevent delay. The attorney general believes that he can finish up the whole business in sixty days, or about the middle of December.

The case will be one of the most important ever brought in this country. It will involve the charters of all the railroads in the anthracite carrying trade, hundreds of corporations engaged in mining and the trunk line suit will put in jeopardy practically all the railroad corporations east of the Mississippi and north of Virginia. The corporation defendants will be:

COAL CORPORATIONS AND CARRYING ROADS.

	Capital	Bonded
Pa. R. R.	\$98,598,964	\$82,280,054
L. V.	33,090,000	21,042,000
Reading	34,734,675	126,831,205
D. L. & W.	26,200,000	3,674,000
D. & H.	23,500,000	15,378,000
Northern Central	6,500,000	16,401,000
N. J. C.	18,365,200	42,764,000
P. Coal Co.	5,000,000	
Erie	85,268,000	36,073,503
N. Y. C.	12,473,650	
L. & W. B. C. Co.	10,000,000	18,073,307

TRUNK LINE RAILS.

Pennsylvania	\$20,000,000	\$16,500,000
D. L. & W.	26,200,000	3,674,000
N. Y. C.	89,428,300	56,424,333
Lehigh Valley	50,000,000	4,436,000
Erie	85,268,000	36,073,503
B. & O.	11,792,565	31,960,547

These are the only leading companies. There are many other smaller railroad and coal producing companies concerned. The array of counsel in Judge Simonton's court, representing all these corporations, will be the greatest ever seen in the United States. A representative of one of the corporations said recently: "If Attorney General Cassidy gets through with this suit in sixty days he will have to be the smartest lawyer that Philadelphia has ever turned out. It will take six months to prepare the legal papers."

Inquiry of the counsel of the receivers of the Reading company on Friday showed that no notice had as yet been given them of the action of the court, and they were therefore unwilling to discuss the matter. One of the counsel said it was customary for prosecuting attorneys to notify opposing counsel of applications to sue, but in this case none such had been given. Opinions and decisions have been handed down by high authority to the effect that combinations under proper restrictions are not necessarily illegal, and he believed that the counsel for the corporations would be able to map out a strong case.

Lignite, which is half-formed coal, has not, up to this time, attracted much attention as a combustible; but there are several parts of the earth in which it is found in abundance; in some cases, notably in Italy, to the exclusion of coal. In Italy there is no coal; the railway locomotives are kept going by means of imported coal; and if Italy were to go to war, it would not be able even to keep up its railway service; for coal is, above most things, a contraband of war. The Italian government has taken this matter up, and has given orders to its railway service to make the locomotives such that either coal or lignite may be burned by them; and this will give a stimulus to the working of the extensive beds of lignite which lie about the centre of the peninsula, half way between the Mediterranean and the Adriatic. On the line of the Northern Pacific and on the Canadian Pacific railways, lignite is found in great quantities, and locomotives will be constructed for its utilization.

The following is the rank in which the six largest coal producing states stand, as to amount of output: 1. Pennsylvania; 2. Illinois; 3. Ohio; 4. Maryland; 5. West Virginia; 6. Indiana.

COAL SCREENINGS.

The Pittsburg local coal trade is said to be as good as ever, in spite of natural gas.

A nine-foot seam of coal has been discovered and opened up in Indiana county, Pa.

Newtown colliery, near Swatara, Schuylkill county, Pa., produced 1,000 tons of coal last month, and it is expected to increase the shipments to 1,500 tons this month. It is probably that the owners of the mine will sink deeper in the spring.

Since the burning of the Pennsylvania coal company's No. 14 breaker at Port Blanchard, Pa., the Ewen breaker at Pittston, which has been idle for some months, is again in operation. The capacity of the Ewen breaker is given at 1,500 tons per day.

The mine worked by Lloyd & Williams, on the east end of Sharp mountain, below Pottsville, has shown five feet of good coal. The operators have spent a great deal of money and time to find this seam and will soon be able to furnish the best of coal.

The Heckshers are making big arrangements for the opening of their new colliery, between Tuscarora and Tamagua, Schuylkill county, Pa., and in connection with them the Bowman and Alliance coal companies, the Pennsylvania are considering a proposition to Pottsville.

Leases were recently made with the Delaware and Hudson canal company for coal land by Darius Varoe, W. J. Lewis and William A. Price. The property makes a large tract and is located in the First ward of Scranton, Pa. The company agrees to pay fifteen cents royalty for each 2,240 pounds of merchantable coal mined from beneath the tract.

The long contested dispute for the division of certain coal seams between L. B. Shoemaker and the Everharts of Luzerne county, Pa., was finally settled in court last week by the parties electing to take no further action. The portion of the coal as described and bounded in the sheriff's writs, the first choice going to the Everharts and the second to Shoemaker. This case is the first instance of coal being divided under the surface, the contention having gone through the supreme court, which reversed the original decision of Judge Rice.

Coking in Illinois.

The coal field of Illinois, according to Prof. Worthen, underlie about 35,000 square miles of the surface of the state. In the measures of this enormous field 16 different coal seams have been recognized, ranging from one to nine feet in thickness, though the seams worked rarely exceed 6 feet, and where they are of this thickness there is usually a slate parting. Much of this coal would be classed as coking coal, but the chemical and physical character of that worked so far is such that little or no coke has been made equal to the coke of the Appalachian field. In the many attempts to produce a merchantable coke from the coals of Illinois three difficulties have been encountered: First, some of the best coking coals are quite impure, carrying a large percentage of both ash and sulphur. Even most thorough washing fails in many cases to remove these impurities. At one works 60 per cent of the coal was washed away and there was still an excess of sulphur and ash. There are, of course, exceptions to this statement. The coal of the Big Muddy district is quite pure, and the coke made from it is comparatively low in sulphur and ash. This coal, however, is not as well adapted to coking as that of other portions of the state. It is a hard, semi-bituminous, free burning fuel, but shows no tendency to run together or coke, even under extreme heat, unless ground fine and wet. A second difficulty with Illinois coal is that where it is sufficiently free from ash and sulphur it is too dry to coke well in bee hive ovens, the form in which it is commonly run. Much time and money have been expended in the search for the oven best adapted to the coking of these dry coals. At one works four varieties of ovens are reported. Notwithstanding these long continued experiments, the question of ovens still seems in abeyance. The bee hive, as a rule, has not made good coke. An oven known as the English drag, varying in dimensions at different works, the ovens at one establishment being 36 feet long, 7 wide, and 2½ high, with a capacity of 500 bushels, or 11 tons, has been used with good results, as has the Thomas. A third difficulty with Illinois coke is that generally it is not strong enough to bear the burden of furnace work without an admixture of Connellsville coke. There were but 10,350 tons of coke produced in the state in 1885.

Freight Rates.

The following are the current rates of freight on anthracite coal from Port Richmond, as officially reported Nov. 20, 1886:

To Bangor.....	To Fall River.....
" Gardiner.....	" Providence.....
" Portland.....	" New York.....
" Saco.....	" Baltimore.....
" Portsmouth.....	" Washington.....
" Newburyport.....	" Norfolk.....
" Lynn.....	" Richmond.....
" Boston.....	" Charleston.....
" New Bedford.....	" Savannah.....

The Delaware, Lackawanna and Western railroad will early next year become a bituminous coal carrier, bringing its tonnage from a section of the Clearfield region.

Lehigh Valley Coal Tonnage.

The following tables give the shipments of coal over the Lehigh Valley railroad and branches, as reported from the forwarding office at Packerton, Pa., for the week ending Dec. 4, 1886:

Anthracite Coal Received and Forwarded

From PENNA. & N. Y. R. R.,

AND

WYOMING REGION.

Sullivan and Erie Collieries

Pleasant Valley do

West Pittston Branch do

Del. & Hud. Canal Co. do

All other Collieries.....

Lehigh Canal, Mauch Chunk.....

Total.....

Same time last year.....

Increase.....

Decrease.....

HAZLETON REGION

For Rail.....

do do Lehigh & W. R. R. do

Lehigh Canal, Mauch Chunk.....

Total.....

Same time last year.....

Increase.....

Decrease.....

UPPER LEHIGH REGION

For Rail.....

Same time last year.....

Increase.....

Decrease.....

BEAVER MEADOW REGION

For Rail.....

do Rail to S. H. & W. R. R. do

do Lehigh Canal, Mauch Chunk.....

Total.....

Same time last year.....

Increase.....

Decrease.....

MAHANOY REGION

For Rail.....

do Lehigh Canal, Mauch Chunk.....

Total.....

Same time last year.....

Increase.....

Decrease.....

MAUCH CHUNK REGION

For Rail.....

Same time last year.....

Increase.....

Decrease.....

TOTAL ANTHRACITE RECEIVED

From Wyoming Region.....

do Hazleton do.....

do Upper Lehigh do.....

do Beaver Meadow do.....

do Mahanoy do.....

do Mauch Chunk do.....

Total.....

Same time last year.....

Increase.....

Decrease.....

Forwarded East by Rail from

Mauch Chunk.....

Same time last year.....

Increase.....

Decrease.....

Distributed as Follows:

To P. & N. Y. R. R. at Lackawanna

to L. & B. R. R. at Lackawanna

Junction.....

To Del. & Hud. Canal Co., Wilkes

Barre.....

To Penna. R. R., South Wilkes-

Barre.....

To S. H. & W. R. R. at Mauch

Chunk.....

To individuals above Mauch

Chunk.....

To Lehigh Canal Mauch Chunk.....

To L. & S. Div. C. R. R. at Packerton

for rail.....

To at and above Mauch

Chunk for use L. V. R. R.

Forwarded East by L. V. R. R.

Local East of Mauch Chunk.....

Delivered to Furnaces and Mfg.

Companies.....

Del. & S. H. & W. R. R. do

" Ironton R. R. do

" Cat. & Fog. R. R. do

" East Penn. R. R. do

" Perkiomen R. R. do

" Bethlehem Branch P. & R. R. do

" M. & E. Div. D. L. & W. R. R. do

" Central R. R. do

" Penn. R. R. Div. do

" New Jersey Division do

" Port Del. do

Total.....

Bituminous Coal Received.

From P. & N. Y. R. R. do

do all other sources.....

Total.....

Total Anthracite.....

do Bituminous.....

Grand Total.....

COAL DELIVERED TO AND RECEIVED FROM A. P. AND N. Y. R. R.

Delivered to them,

From Wyoming Region.....

do Hazleton do.....

do Beaver Meadow Region.....

do Mahanoy do.....

Total.....

Received from them,

From Sullivan and Erie Region.....

do Pleasant Valley do

do West Pittston Branch.....

Total.....

Total Anthracite Coal.....

do Bituminous.....

Total delivered and received.....

There is a demand for coal in every direction.

COAL DEVELOPMENTS.

Coal is now being taken from the land of B. H. Throop, at Dunmore, Pa., by Murray and Jackson, who have leased the tract.

The Lehigh Valley company is reaching out in the matter of its coal trade, and will have an immense tonnage open to it in a few days.

The Williamstown colliery of the Susquehanna coal company, in Lykens valley, Pa., has just been provided with four nests of cylindrical boilers.

Lehigh coal and navigation company's half yearly dividend is two per cent. The reduction is due to the low price of coal during the past year.

Three different collieries on the west side of the Susquehanna river, near Wilkes-Barre, Pa., are now driving towards the Red Ash seam expecting to strike it within twenty days.

A large ventilation fan—25 feet—and a pair of first-motom hoisting engines with twenty-inch cylinder, and 36 inch stroke, are being manufactured for the Susquehanna coal company at Nanticoke, Pa.

The new opening of the Old Forge colliery, near Pittston, Pa., is being provided with new double geared engines for tight and loose drums to work two different lifts. They have an 8-inch cylinder and 30-inch stroke. A new ventilation fan 20 feet in diameter and a single engine of 16-inch cylinder and 30-inch stroke are also being built.

What is generally considered the best accomplishment in the line of shaft sinking, was that done by Maddock and Goad, the contractors who sunk the Oxford shaft in Lackawanna county, Pa. The size of this opening is 11x30 feet in the clear, and they sunk 70 feet in one month's time, at the same time effecting the general inside work that comes with such contracts.

Coke Syndicates at Home and Abroad.

The manufacturers of coke in Westphalia, which possibly ranks third among the coke-manufacturing centres of Europe, Durham being the first and Belgium the second, have had, until recently, a syndicate or pool for regulating the production and prices of their product, somewhat similar to the Pittsburgh syndicate, which controls the output of the Connellsville region in this country. This pool has recently been broken up, and as a result the coke manufacturers are panic-stricken. Since the syndicate went out of existence the price has fallen 20 per cent, and the tendency is still downward. Under these circumstances it is not at all surprising that earnest endeavors are in progress looking to a renewal of the syndicate. It is with syndicates as it is with a great many things in this world: their good or evil depends upon the way they are used. The coke syndicate in the Connellsville region has in no respect been an injury either to the coke trade or to consumers. Its action has been in the highest degree conservative, and the price that has been put on the ovens of the syndicate was not at all excessive. Indeed, in view of the demand for coke, the quality of the Connellsville product and the rapid exhaustion of the field, it has been low, while at the same time the members of the syndicate and other producers have made a fair profit upon their product and interest upon their investment. If the syndicate pursues the same policy in the future we imagine but little wellfounded objection can be brought against this pool. The old theory that such combinations are against public policy is an absurd one. It is public policy that all industries shall make a fair return in profit and interest to those engaged in those industries. It may be temporarily to the interest of consumers of a given product that they shall get their material at a rate that shall pay its producer no profit, but the only basis on which manufacturing will long be conducted is that it shall return a profit to those engaged in it, and hence, if it is to the public interest that a given industry shall be continued in the country, it is to the public interest that it shall pay a profit, and if a syndicate is necessary to earn this profit it is in accordance with public policy that one shall be formed, provided that the syndicate does not become extortionate in its demands and prices.

Martin Duffy, aged 13, of Bellevue, was employed as a driver in the Dodge mine of the D. L. & W. Co., Wilkes-Barre, Pa. On April 22, 1884, he was caught between a car and the gangway and sustained injuries from which he died. His father has brought suit against the company, alleging that the roadway at the point where the accident occurred was not of proper width and demanding damages in \$20,000 for the loss of his son's services.

After numerous conference between the employees of the Logan and Central collieries and the operators of these mines it is said that a satisfactory adjustment of the difficulties which threatened to bring about a strike of 1500 workmen, has been effected. The Knights of Labor have not made public the terms of agreement, but it is understood that concessions were made on both sides and that the miners will obtain a slight advance.

An eight foot seam of Red Ash coal has been discovered on a large tract of land owned by the Northumberland coal company and situated about five miles north of Mt. Carmel, Pa. The coal is said to be of excellent quality and almost unlimited quantity. Negotiations for the opening up of the tract next spring are pending.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for suggestions and of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

Relating to Gas.

Editor Mining Herald and Colliery Engineer:

SIR:—The following is submitted in answer to "T. B.," of Phillipsburg.

1.—Supposing you had a heading filled with gas, being 100 yards ahead of the air and that solid gas, how would you clear it out and your mine ventilated by furnace (and no dumb drift) to prevent ignition at the furnace?

1st. I would withdraw all persons working in the return from such a place.

2d. I would then put in a brattice of deals or canvass to carry a current of air sufficient to drive out the gas slowly or by degrees, and also have one or two currents of fresh air going into the return (if practicable) to dilute that current of gas, and so mix that current charged with gas to non-explosive.

3d. In case the above would not be practicable carried out, as a more easy method I would damp down the furnace and brush all the gas out of the heading or turn in a current of air sufficient to drive all the gas out of the heading, while the heat of the upcast shaft would keep up the ventilation for the accomplishment of this purpose.

4.—What is necessary to render mines healthy and free from explosions?

Plenty of fresh air circulated through the mine, the renewal of all decayed timber, &c., and allow no water to stand in worked out or abandoned places, but let it be properly drained off.

5.—What kind of safety lamp is best adapted for examining mines, and what kind for working?

The Davy safety lamp being only surrounded by gauze the gas reaches the flame direct and can be easily seen, it is thus very "sensitive" to gas, and is best adapted for examining mines but not fit to be placed in inexperienced hands, being the most sensitive and also the most dangerous. The Stephenson for persons inexperienced while working, in other cases the Clanny or Mueseler are to be preferred, as giving more light.

6.—Why are they called safety lamps, and is there any danger in their use?

Because it gives evidence of the presence of gas without exploding it outside the lamp. Dangers there are in its use. Any defect in the lamp may cause an explosion. A sudden movement of the lamp may force the flame through the gauze, especially if such movement is against the current, as experiments prove that a current of explosive mixture with a velocity of 7 to 8 feet per second will pass through the gauze of a Davy lamp and be exploded, in all these cases there are dangers in its use as in either case an explosion may be produced.

7.—What causes natural ventilation, and can it be relied on at all times?

Natural ventilation is caused by the heat of the mine and difference of the surface levels. As the temperature of the mines is sometimes 20 or more degrees higher than the temperature of the air coming from the downcast or inlet, and as there is a difference in the temperature of the air inside and outside of the mine, there is a current of air created. So when two shafts are sunk from different surface levels to the same level of a seam and connected by an airway, and the greater the differences the better the results will be. But certain periods of the year the temperature of the air in mines and that outside become equal, consequently the circulation of the air in the mine will stop, so this means of ventilating mines is unreliable.

8.—Where will the furnace give the best results, at the top or bottom of a shaft, and why?

At the bottom of the shaft. The reason why, is, because there is a longer column of heated air which is the true principle of ventilation.

9.—In a mine generating large quantities of fire-gas, what means would you employ to produce your ventilation and how would you distribute your air? I would put a large fan in, in some cases a blow down fan—it would depend upon where I could get my upcast, but I prefer the exhaust fan. I would distribute my air by splitting it into different currents.

10.—At what velocity would the air have to travel in a drift six feet high and eight feet wide at the bottom and seven feet wide at the top to supply one hundred men with the least quantity of air required by law?

The question as it stands is not stated correctly, it ought to be 7 feet high, 8 feet at bottom and 6 feet at top. The following formula will enable us to arrive at the answer:

$$v = \frac{Q}{a} = 177.77.$$

Then quantity 10,000 cubic feet, area 56'25 cubic feet, velocity 177.77.

$$\frac{10,000}{56.25} = 177.77$$

9.—The water pump in a mine is circular and eighteen feet in diameter and its depth is eighteen feet. The capacity of the pump in use is two cubic feet of water discharge for each revolution. How many revolutions will it require to empty the pump? Then diameter

$$18 \times 18 = 324 \text{ feet.}$$

$$324 \times .7854 = 243.4696 \text{ cubic feet}$$

area of the sum.

$$254.4696 \times 18 \text{ depth of sump} = 4580.4528$$

total number of cubic feet in the sump.

4580.4528 ÷ 2 number of cubic feet of water discharged per revolution = 2290.2264

total number of revolutions.

Yours, &c.,

W. B.

Phillipsburg, Pa., Nov. 30, '86.

Is It a New Danger?

Editor Mining Herald and Colliery Engineer.

SIR:—A short time ago an explosion occurred at the burning Standard mine near Mt. Pleasant, Pa., by which four men were badly burned. These mines caught fire some time ago from a wagon of burning hay. While the mines were being flooded an English engineer proposed to put it out with hose, so the flooding was stopped. Brick stopping, with iron doors in them, were put up at several places, dividing the five into sections, but all sections being in direct and unobstructed communication with the atmosphere at all times. Through these doors the men would crawl with the hose and throw water on the fire, leaving the doors open at the same time that they might get sufficient fresh air to breathe. The explosion referred to occurred shortly after the men had gone into one of these sections with the hose.

The English engineer in charge hooted the idea that it was an explosion of carburretted hydrogen (CH_4). He says it was an explosion of superheated steam, which, so he says, is nothing unusual in time of fires in English collieries. Should any of your able correspondents inform us, through this journal, as to whether an explosion of this kind could occur under these conditions, and if so would it burn—be a combustion as in this case; they would lift a cloud from the minds of many practical miners.

Wishing to see the matter thoroughly discussed, I am

Yours, &c.,

ANXIETY.

Mt. Pleasant, Pa., Dec. 1, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any of your readers oblige by answering the following questions:

1. How much more air would pass through an airway 10x10 feet, than one 5x5 feet, the velocity being the same in each airway?

2. An airway 19 feet high, and 6 feet wide, and 3,000 feet in length, what is the total rubbing surface?

3. A shaft mine is ventilated by furnace power, the up and downcast shafts are each 500 feet deep, the weight of a cubic foot of air in the downcast is .084, and in the upcast it is .065 pound, what is the pounds pressure per square foot producing the ventilation, and what would be the motive column?

4. If you have two airways, one square the, other circular, each 3,000 feet in length, the area of each being 100 feet, would any more air pass through the one than the other? The power producing the ventilation being the same in each case, which airway (if either) would pass the greatest amount of air and why?

Yours, &c.,

LEARNER.

Phillipsburg, Pa., Dec. 1, '86.

Varied Answers.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following in answer to T. B.'s questions of the 27th inst.

1. It would be necessary to dilute the undiluted gas with a sufficient quantity of air, say 40 of air to one of gas, which could be done in a variety of ways but not giving sufficient data I cannot work it out in figures.

2. An adequate amount of ventilation.

3. The Davy is considered a good indicating lamp. There are a great number of good lamps, such as Gray's Lamp, Marsant's, the bonneted Mueseler and Evau Thomas' modification of the bonneted Clanny lamps.

4. For the reason that they have been invented for the purpose of rendering the process of mining in dangerous gases safer. But none are absolutely safe.

5. Natural ventilation is not at all times reliable for the reason that it is caused by a difference in the density arising from a difference of temperature betwixt the upcast and downcast column, which in certain seasons of the year are equal in density.

6. I should prefer the furnace at bottom for the

reason that we should get a higher column of heated air.

7. In a mine generating large quantities of fire-damp the mode of ventilation which I should adopt would be according to circumstances. If a shallow mine would prefer a ventilating machine; if a deep mine by furnace and should distribute the air in separate divisions or splits using a dumb drift and supplying the furnace with pure air from the inlet.

8. The velocity of air to supply 100 men with the least quantity of air required by law as follows: 100 ft. per man per minute

$$\text{Area} = 8 + 7 = 15 \div 2 = 7.5 \times 6 = 45 \text{ ft.}$$

$$100 \times 100 \div 45 = 222.2 \text{ ft.}$$

per minute velocity.

9. The cubical quantity of water in dump is as follows:

$$18' \times .7854 \times 18 = 4580$$

$$4580 \div 2 = 2290 \text{ revolutions.}$$

STUDENT.

Phillipsburg, Pa., Dec. 4, '86.

Why Is Resistance Equal?

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following question in your valuable paper:

Show why an airway half mile long offers the same resistance to a given current as do two airways one mile long each?

By inserting the above in your valuable paper you will greatly oblige

A NEW SUBSCRIBER.

Phillipsburg, Pa., Dec. 4, '86.

Determining the Air.

Editor Mining Herald and Colliery Engineer:

SIR:—Answering the questions of "M. E." on ventilation he will find the following about correct:

He will find that the 6'x6' airway is not passing as much air as the 6'x5', because of the longer rubbing surface. This can be worked out in different ways and I would like to see some of your able correspondents do so; and then we will discern the best way of working splits out, as they are a matter of importance:

The first 6x5 and 2,000 feet long.

" second 6x6 " 4,000 "

" third 5x5 " 2,000 "

By Atkinson formula:

$$1. \quad V^2 = \frac{v^2 a}{K s}$$

calling $\sqrt{1}$ we have

$$V^2 = \frac{1 a}{K s} \text{ or } \frac{30}{.0217 \times 22 \times 2000}$$

$$V^2 = 0.31420 \text{ and } \sqrt{0.31420} = .177$$

relative volume in thousands of feet per minute.

$$2. \quad V^2 = \frac{36}{.0217 \times 24 = 4000} = 0.17281$$

$$\text{and } \sqrt{0.17281} = .131$$

relative volume in thousands of feet per minute.

$$3. \quad V^2 = \frac{25}{.0217 \times 20 \times 2000} = 0.28801$$

$$\text{and } \sqrt{0.28801} = .169$$

relative volume in thousands of feet per minute.

First $.177 \times 1000 = 177 \times 30 = 5310 \text{ cu. ft.}$

Second $.131 \times 1000 = 131 \times 36 = 4716 \text{ "}$

Third $.169 \times 1000 = 169 \times 25 = 4225 \text{ "}$

14251

Now as we have found the relative volumes in thousands of feet per minute, we must next find the relative quantities:

$$50,000 \times 5310 \div 14251 = 18630.27$$

feet going into the first split.

$$50,000 \times 4716 \div 14251 = 16546.21$$

feet going in second split.

$$50,000 \times 4225 \div 14251 = 14823.52$$

feet going in third split.

$$\text{Total } 50,000$$

Yours truly,

J. A. S.

Cambria, Pa., Dec. 3, '86.

The Air Amounts Desired.

Editor Mining Herald and Colliery Engineer:

SIR:—A mine having two separate divisions A. and B. The B air course is 5+5 ft. and 2000 ft. long, and produces 5000 ft. of air per minute; the A air course is of a square cross sectional area 1680 ft. long and produces 1000 ft. of air per minute. What amount of air will the B air course produce when we close the A air course?

Yours, &c.,

L.

Wilkinsburg, Pa., Dec. 3, '86.

Anthracite is almost pure carbon.

THE FORMATION OF COAL.

An Address Delivered by Mr. John Hale at the Teachers' Institute at Scranton, Pa.

Specially Reported for the MINING HERALD.

(Continued from Page 417.)

And now will naturally come to our notice the "clay rock," or fire clay, as it is termed by a great many of our scientists. This fire clay is always found beneath every bed of coal which are in various mineral composition. Sometimes they are unctuous or greasy clay and contain sand with a small quantity of silicious matter which has a tendency to harden the clay.

It is well understood by all good practical miners and mine engineers, that this bottom or under clay is unstratified. They differ totally from the shales and sandstone; instead of splitting up readily into thin layers, they break into irregular shapes and lump masses. And this contains a very peculiar vegetable fossil called "stigmneria" and can be seen in an innumerable number of branches of this peculiar vegetable fossil which is dotted all over with little pits. This strange fossil was for a long time a sore puzzle to fossil botanists, but it has been finally solved by the best authority and has given a great satisfaction to the geologist.

We must not forget that the law of gravity—chemical affinity—is faithfully at work throughout this whole formation. It has pleased the ruler of the whole universe, the giver of all good, to furnish the elements that constitute the materialistic world. Also he has established certain laws to govern in the formation of those coal measures; and the material is susceptible, by the agencies known to scientists, of three different forms—the gaseous, the liquid and the solid. So it can be solved how those agencies are at work in the general formation. The great conglomerate is the favorite bed upon which to lay this precious black diamond of ours which is named coal. The specific gravity and chemical properties of coal have been noted before. And coal contains the same chemical properties, but not in the same proportions. Hence the different kinds of coal are largely composed and formed of various kinds of vegetation; this is the most prominent in the chemical composition of that certain kind of coal. It is understood by all scientists that we can not show anything that can be obliterated in nature but is transformed; and in the coal formation the elements are not lost but transformed and still they adhere to each other with that certainty that knows no failure.

It is generally admitted that fire clay was the soil and subsoil upon which grew the vegetable matter which enters very largely into the different compositions of coal. It is also admitted by the best authorities that coal is composed of vegetable matter. The question now under consideration is how did this vegetable matter accumulate in such large quantities and with such regularity. One theory upholds that the coal was formed out of dead plants, sand, mud and many other things, but very different from what our geologists uphold in those days. Again the theory which is generally known as the "drift theory," which was inadequate to account for the facts as we now find them. Another claimed that the coal was formed out of plants and trees that grew and were deposited in the locality where the coal is found.

On this supposition we could very readily account for the foreign mixture, sand, mud, or clay, in the coal. Also it would be better understood by the aid of the "drift theory" how the coal had accumulated with such wonderful regularity and uniformity of thickness over such large areas of territory. The theory was for some time very slowly received, until after the discovery of Sir Wm. Logan, who claimed that every bed of coal had an under clay. Again, the discovery of Mr. Benny, who proclaimed that those under-clays were true soils on which plants had grown. There is no doubt in our mind, but that this was the real and true explanation of the whole matter.

By examining a section of peat bog in a swamp, it will be seen that the resemblance between the two are very striking indeed. The peat bog is a great mass of vegetable matter, annually growing thicker, and underneath it we always find a bed of clay in appearance and very much like the under bed of clays in coal measures. This clay is penetrated by the rootlets of the moss forming the peat. It is almost the same as the under-clays of the coal measures which is penetrated by the stigmneria and its rootlets.

But we must not expect that the plants of which coal was formed, were exactly the same as the low type of moss which form our present peat bog. Science has advanced considerable in regard to the coal plants and their affinities, which has not been thoroughly understood; also the affinities to modern vegetation needs further criticism and explanation. However, it is certain that they were for the most part a loose succulent texture that grew very rapidly.

After briefly explaining the theories relating to the

formation of coal, it is not supposed all of this great change has taken place by either theory. This has been accomplished without the aid of chemistry and great heat. Now, a question will naturally come. How was it possible for so large a quantity of vegetation at one time to compose such large seams of coal? Replying to this question is not the easiest of problems to solve. We are informed by the best authorities that the carboniferous age was wonderful to propagate vegetable growth. It would not strain our imagination very much to account for the great "coal flora" as it is termed.

Trees of wonderful height and form seem to have grown in close proximity to each other as well as every other kind of vegetation peculiar to the age. The deep rooted stigmneria, the towering lepidodendron and the gigantic calamite, with their numerous species which have filled the lakes and swamps to their brims with magnificent luxuriance of foliage spreading over the surface.

Carbonic acid shrouds the dark green in still deeper hues, and imparts to the growth a vigor unknown to later ages. It is understood that bitumen and carbo produce oil which floats through the mass, and by that process it will preserve it from decaying and it will add a vast amount of acquisitions to its bulk. A shower of volcanic dust was the natural course of nature at one period and the result was that the dust and ashes produced crushed the tender growth and thus formed a streak of slate or bone as we now find it in all of the seams of coal formation. This thin layer rested easily without disturbing the floating mass of vegetation. This ultimately of its own weight formed the different streaks that are seen in seams of coal, and while these volcanic eruptions were predominating, the mammoth seam of sixty feet in thickness would be settling, resting, and forming at the great depth where it is found at this age. This was done with the regularity of benches, slips and partings. Eventually these changes took place as the result of the subsidence of the volcanic actions which caused the growth of the aqueous vegetation. It must have been caused by the bed of the sea being raised above the level of the water. We have a distinct proof in many instances that elevation in the bed of the sea and depression in the land is now going on all over the whole creation.

Nature is working just as diligently on the earth's surface now as ever before. We find the numerous corals building their mansions in forming the stratified rocks into mountainous structures in the foaming sea. Therefore we are not assuming anything beyond the range of our experience in saying that the elevations and depression went on during the epoch of the coal formation. The pantheism theory must not remain a fiction in nature; for the plants sprung up and grew fast and multiplied rapidly in a comparatively short time. This vegetation was growing 5 feet in 24 hours and decaying daily, and in this manner was accumulated in great heaps or layers of decomposed vegetable matter. This was slowly passing through the same chemical changes as before described. The shales and sand stone that were deposited were carried by the action of the water and compressed into layers or seams just as we now find them.

The very same process occurs at the formation of every member of the coal measures. There seems to be no end of the proofs to substantiate the fact that all vegetation composing the coal grew on the spot where the seams are formed.

The strongest proofs are the numerous impressions found all over the coal areas. By the aid of the microscope in the hands of "fossil botanists," they are enabled to establish, beyond a doubt, the chemical properties of vegetable matter and can locate the numerous plants in the stratifications. There are theories to prove the above statements. The first we must mention is the "Drift" theory; secondly, the "Peat Bog" theory, which is also well known; third, the "Marine" theory; fourth, the "Petroleum" theory; fifth, the "Mineral"; sixth, the "Volcanic"; seventh, the "Ossilation" theory.

Each of these seven theories have their strong advocates. It would be folly in us to try to give a description of them. But we shall endeavor to explain how some of the seams of coal are thicker than others. The coal beds of the anthracite formation are over thirty in number and vary in thickness from less than one inch to one hundred feet. One cubic inch of coal will contain just as much of vegetable matter when taken from a thin seam; the same as the thick one and nearly of the same quantity. But we do not believe that the one inch took as long to form as the one hundred feet.

We maintain that those periodical changes took place at the formation of each of our numerous seams of coal. The thickness is governed to a great extent by the length of time that the vegetation is permitted to grow undisturbed. Therefore, thin seams are made up of small growth, and the thicker seams are made up of more mature growth and so on through the whole number. There is nothing in nature that will prove that those disturbances occurred at stated times, any more than they do at this age.

There are earthquakes occurring in various parts of the world, but not at regular intervals. Therefore, we maintain that they did not account for the different thicknesses of coal seams.

We shall here make a few remarks on the sectional stratification. When the coal was in process of formation the ground forming the bed was level, and when the growth was completed and the seams formed, an interval of eruption took place and disturbed the whole formation, twisting the seams out of their original shape, and also the rock formation to the very lowest strata. In proof of this statement we shall examine the outcrop of our

seams on the hillside and mountain top, where a large proportion of the coal has been washed away by the floods of the past. We believe that this has been deposited elsewhere hundreds or thousands of miles from the place where it was first formed. This may be forming another coal strata for future generations.

Again we have the "faults" which occur in coal measures very frequently; which are the result of local eruptions, the seams being severed by the force of the concussion. When thus severed the cavities formed were filled by the various masses of slate, rock and other matter that became loosened by the agitation of the eruption. In "faults" we find coal laying at every degree of angle from horizontal to 70°, or even 90° of pitch.

To account for this difference in the position of coal strata, we will assume that the district or basin having the most pitch or inclination has been disturbed the most. Likewise the locality where the coal is found is the nearest to the horizontal which has received the least effect of the disturbances.

It is not known in what period in the formation of the coal strata that those disturbances took place; some claim that this occurred after the formation was completed. Others claim that when the coal was in a fluid or plastic state. The latter seems to be the most reasonable. We find some of the formations forming the most beautiful curvatures, which could not be formed if the coal had been crystallized.

COKE NOTES.

It is reported that a syndicate of capitalists are trying to buy up all the coal lands in Ohio.

The Webster coal works, on the Monongahela, which have been idle for some time, have started up again.

The Loyallanna coal and coke works at Latrobe, Pa., whose tipple was burned several months ago, started up again last week.

The auditor appointed to look into the affairs of the Dunbar coke company, finds the assets to be \$1,200 and the liabilities \$27,879. The creditors will get about 4 per cent.

The Standard works at Mt. Carmel, Pa., resumed operations on Monday, the 29th, when a small quantity of coal was run out the shaft and a few of the ovens fired. The managers expect this week to see them all fired.

The engine house and tipple of the Unity coal and coke company, near Latrobe, Pa., were burned to the ground on the 27th ultimo. The loss will run up into the thousands and many men will be thrown out of employment for some weeks.

The Connellsville, Pa., Courier says that there is considerable dissatisfaction among river coal operators over the cutting prices in the lower markets. It is said that the coal kings who had unusually heavy shipments, disposed of their coal at fully one cent per bushel less than could have been obtained.

W. J. Rainey, the chief owner of the Moyer and Fort Hill coke works in the Connellsville, Pa., region, entered suit against the Baltimore and Ohio railroad company in the courts of Ohio, on the 27th ult., claiming \$75,000 for alleged breach of contract. The ground of complaint alleges that Rainey is the owner of six hundred acres of coal land in Fayette county, and that the railroad agreed to build a branch from the Pittsburg and Connellsville road to his land, so that he could deliver coke to a Cleveland rolling mill. On the strength of such contract he began the construction of a plant to convert coal to coke at a cost of \$10,000, but the railroad has refused to perform its part.

A considerable foreign industry has sprung up consisting in mixing the dust of coal with an extract obtained from boiling ordinary seaweed or other similar vegetable matter producing, when boiled, a mucilaginous or adhesive solution. In the system of manufacture pursued, the plan is to first soil seaweed or some other vegetable product, capable of yielding, when boiled, the desired mucilaginous or adhesive solution; with the latter there is then mixed a certain proportion of coal dust, in the same manner in which cement, mortar or other materials of that nature are treated. The combined substances are subsequently molded to any required shape by hand, or by means of a brick making or some similar apparatus. By combining the solution with sawdust, filtering blocks are formed.—*Boston Budget.*

IMPORTANT.

When you visit or leave New York City save Baggage, Expressage and \$3 Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot.

613 Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best. Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city. 23-ly

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We, therefore, request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

TRADE REVIEW.

THE COAL TRADE.

In present business there is no new feature of importance to notice, since the review of last week. Shipments of coal go steadily on and there is a tendency to increase, so rapidly do stocks find market demand; so that the anticipated addition to the output may come after this week. Prices are unaltered, and it is probable that they will, as President Potts; of the exchange, intimated last week, remain as they are through the winter. The call for manufacturing fuel remains active and most of the staple industries being somewhat better off for orders there is every likelihood of this branch of trade maintaining brisk sales and improving with the new year. Every effort will of course be made during the time between now and the Christmas holidays to clear off all the orders it is possible to complete, so that the consumption of fuel will be of an active character. House-fire requirements are on the increase, the weather being of the most favorable nature for that department of demand. Inability to fill orders for stove and chestnut sizes, is reported by the Reading and Lehigh Navigation companies, while the others have experienced calls that will leave them in very good shape by the middle of the month. Stocks in no size are reported as gaining in amounts on hand—if anything the reverse state obtains. Viewed from all quarters the outlook for the anthracite coal trade is better at this stage of the season than for several years past; less coal being likely to be carried over to the new year, prices being steadily and fairly remunerative, while the concert of action between the coal managers shows much solidity—apparently unaffected by the clap-trap suit of Governor Pattison and Attorney-General Cassidy, the first steps in which are reported elsewhere. No one expects anything to come of this move, and hence no one is exercised by it. The limited time for action left the prime movers is, if nothing else were, a bar to any mischief. Cassidy's talk of finishing the suit in a fortnight or so is the merest balderdash. Such momentous questions and issues as are bound up in a suit of this nature, are not to be and will not be lightly and hastily decided to meet the wishes of a pair of demagogic lawyers, whose political fortunes necessitate their posing for effect. The ablest and most determined of legal battles will be fought, if this matter of the right to restrict or enlarge business as suits the participants therein is ever forced to a final decision. Time and capital will be largely consumed, as they should be. There are great principles at stake in such a contest that must and will be maintained with ability and resolution. In the settlement of them, as prosecutor-in-chief, Pattison and Cassidy will play slight parts, if any. The balance of their administration will wane long before any conclusion could be reached, and their folly is unlikely to be accepted as a legacy by the incoming regime.

Just at present, President Corbin, of the Reading company, is cutting a prominent feature as a reorganizer of that company's fortunes on the principle of "A dollar earned is a dollar saved." Some of the economies instituted, where they have cut off superfluous and often honorary officials, have been of a wise and business-like character, but others again, especially those reducing the wages and privileges of low paid operatives, have been petty and penuriously cruel, unworthy of him who ordered them. It is to his credit, though, that being convinced of his error in several of these instances, President Corbin has had the manly courage to recede from his action. There are growing indications that the new chief intends to retire from the mining of coal by leasing the collieries to individuals or smaller corporate bodies. Mr. Corbin says that \$60,000,000 having been sunk in Reading mines in fourteen years, it is time to try another tack. So far as traffic for the railroad is concerned, he believes that as a lessor the company can stand in as good a position as when mining its own coal. While renouncing nominal control of its collieries, it can still be the power behind the throne.

In the bituminous trade a stiffening of prices is reported, rates being \$2.30 per ton at Baltimore and Philadelphia and \$3@3.25 at New York. The formation of the pool progresses favorably, so far as the operators are concerned, the clash on quotas having been satisfactorily adjusted by the sub-committee appointed for the purpose. The only obstacle now anticipated is that the carrying

companies will refuse to recognize any limit of tonnage and thus bar the success of the pool. An official of one of the transportation companies, however, is reported as having said that this fear is groundless. He says: "The railroad's can no longer afford to carry that class of fuel at from 2½ to 4 mills per ton per mile and continue to pay the fixed charges upon the bonded debt of their corporations; to say nothing of dividends, and that a well regulated pool will enable both the operator and transporter to make expenses at least without interfering with iron and other industries, as manufacturers knowing that the cost of coal is fixed by the season, can more satisfactorily make contracts for their own wares."

The total amount of anthracite coal sent to market for the week ending November 27, as reported by the several carrying companies, was 687,043 tons, compared with 708,339 tons in the corresponding week last year, a decrease of 21,296 tons. The total amount of anthracite mined thus far in the year '86 is 27,366,823 tons, compared with 28,756,161 tons for the same period last year, an increase of 610,662 tons. The following statement gives the gross tonnage for each of the leading coal carrying companies for the week ending November 27, and for the year to same date, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R.R.	291,000	13,006,353	12,413,369	592,984
Lehigh Valley		6,656,147	6,258,178	397,969
D. L. and Western	38,821	4,636,132	4,561,609	74,523
Shamokin	17,364	761,396	938,589	177,193
End R.R. N. J.	45,369	1,866,273	1,805,965	60,308
Penna. Coal	28,310	1,876,870	1,316,261	560,609
Del. and Hudson	75,248	3,756,555	3,660,908	95,647
Pa. and N.Y.	1,876,870	1,876,870	1,876,870	0
Cleaveland P.	48,772	2,021,127	2,069,591	48,464
Hun and B. Top.	11,937	589,340	572,791	16,549
Nor. and Wta.	19,296	780,666	538,487	242,179

The reports of the Lehigh Valley and Pennsylvania and New York railroads are for the fiscal year ending November, 30.

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Nov. 27 was 300,460 tons, of which 214,832 tons were coal and 85,628 tons coke. Of this weekly tonnage 221,329 tons originated on the main line of the Pennsylvania railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 13,687,307 tons, of which 10,476,920 tons were coal and 3,210,387 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending December 4, was 303,000 tons, of which 36,900 tons were sent to and 32,000 tons shipped from Port Richmond, and 30,500 tons were sent to and 29,000 tons shipped from Elizabethport. Vessels are reported in fair supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at 85¢@90c. and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending Nov. 27 were 62,294 tons, and for the year to that date 2,290,434 tons, a decrease of 264,173 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—week, 49,783 tons; year, 1,785,454 tons; decrease, 38,137 tons. To Pennsylvania railroad—week, 3,140 tons; year, 236,118 tons; decrease, 150,489 tons. To the Chesapeake and Ohio canal—Week, 9,371 tons; year, 278,862 tons; decrease, 75,547 tons.

Chicago.

From the Industrial World.

Anthracite coal is moving a little more freely, which has tended to ease up matters in a measure, but there is by no means sufficient in sight to supply the wants of all consumers. The receipts for the month of Nov. are in round numbers about 120,000 tons, while the requirements equaled fully 200,000 tons. Dealers are daily in receipt of telegraphic and mail advices from country merchants in the north-west urging the immediate shipment of their orders, as the weather is becoming severe, and they are badly in want of coal. In order to comply with these requests, dealers are using every means in their power to facilitate shipments, and are still obliged to turn away new business. It has been decided, it seems, to make no change in the present card prices. Nearly all sizes of hard coal continue at a premium of about 50 cents over rates for immediate delivery, and nut coal is particularly scarce. Although many of the largest docks and yards in the city are comparatively bare, dealers do not look on the fact in a disparaging manner, as they say all

rail coal is bound to move more freely during the winter as long as it is in demand.

Considerable comment has been caused by the report that two great combinations have been formed to control the entire soft coal output of the country. One of these, the Ohio pool, consists of the Hocking Valley railroad, the Wheeling & Lake Erie, the Toledo & Ohio Central, and the Pan-Handle division of the Pennsylvania system. The railroads advanced freight rates on coal about 25 per cent. The other pool is in western New York, and has not yet perfected its plans. Dealers are unwilling to admit that this could be done by the railroads, but one thing is certain, and that is that Chicago prices have already been affected to the extent of 10 to 15 cents per ton, making Hocking, Baltimore & Ohio, Pittsburg, and Wheeling \$3.25, and Wilmington \$2.25.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.

	Per gross ton by carload, 2240 lbs
Grate.....	\$ 15
Egg.....	15
Stove.....	15
Nut.....	15
Lehigh Lump.....	15
No. 4.....	15

	Per net ton by carload,
Grate.....	\$ 50
Egg.....	50
Stove.....	50
No. 4.....	50
Nut.....	50
Lehigh Lump.....	50

BITUMINOUS.

Erie & Briarhill.....	\$ 40
Pittsburg.....	50
Indiana Black.....	25
" " Slack.....	1 25@1 50
" " Nut.....	1 50@1 80
Baltimore & Ohio.....	25
Hocking Valley.....	25
" " Slack.....	3 50
Wilmington.....	25
Blossburg.....	25
Cumberland Smithing.....	3 70
Common Smithing.....	2 00
Grape Creek.....	2 00
Fountain County.....	2 00
Union Lump.....	2 00
Streator.....	2 00
Minonk.....	2 00
Morris.....	2 00

CANSEL.

Kanawha.....	5 00
Buckeye.....	4 35

COKE.

Connellsville Coke.....	4 75@5 00
Highgate.....	4 75@5 00
Charcoal, carload per bu.....	85¢@90¢

Pittsburg.

From the American Manufacturer.

There has been a good stage of water all the week, and over 3,000,000 bushels have gone to the lower markets. Prices at Cincinnati and Louisville remain the same, being in the former 5½¢@6¢, in the latter from 6¢@7¢. The higher prices are for second pool coal; the lower, for third and fourth pool. Here and at New Orleans, prices are about the same as last week. With lots of water most boats are running, and empty crafts come back freely.

We quote as follows:

PRICES AT PITTSBURG.

River, wholesale, on board.....	4 @ 5 cts. per bushel.
Railroad.....	4½ @ 5 cts. per bushel
AT CINCINNATI.	
River, wholesale, on board.....	5½@6½ cts. per bushel.
AT LOUISVILLE.	
River, wholesale, board.....	6@7 cts. per bushel.
AT NEW ORLEANS.	
River, wholesale, on board.....	30cts. per bu.

Bushels are rated among dealers here at 76 lb.—26½ bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

The prices of coke for December have been fixed. They are the same as for some months past as follows: Blast furnace, \$1.50, f. o. b. cars at the ovens; foundry, \$1.75; crushed, \$2.25. The supply of cars is good.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Dec. 4, 1886:

	Week.	Year.
	Tons.	Tons
Shipped North.....	38,471.09	2,222,474.06
Shipped South.....	62,612.15	2,514,741.47
Total.....	101,083.24	4,737,215.53
For corresponding time last year.		
Shipped North.....	47,328.03	2,266,083.99
Shipped South.....	58,971.04	2,401,826.05
Total.....	106,299.07	4,667,909.14
Increase.....		67,307.19
Decrease.....	5,215.03	

Pennsylvania Coal Company Shipments.

Following is the report of shipments of Pittston coal for the week ending Nov. 27, 1886:

Shipped East to tide.....	20,942.19
" " Local points on E. M. & Erie.....	3,635.01
" " West via L. S. & Erie.....	3,832.01
Total.....	28,310.02

Navigation upon the lakes and canals is now closed for the season, and shipments of coal will hereafter be via all rail routes.

THE GIANT POOL.

Called Into Court With Pennsylvania as Plaintiff—Grounds of Complaint—List of Defendants.

Attorney General Cassidy has filed in the court of common pleas of Dauphin county the bill in equity between the state of Pennsylvania, plaintiff, and the Grand Trunk railroad company, of Canada, the New York Central and Hudson River railroad company, the West Shore company, the Delaware, Lackawanna and Western railroad company, the New York, Lake Erie and Western railroad company, Baltimore and Ohio railroad company, Lehigh Valley railroad company, Philadelphia and Reading railroad company, Allegheny Valley railroad company, Buffalo, New York and Philadelphia railroad company, Cincinnati, Washington and Baltimore railroad company, New York, Pennsylvania and Ohio railroad company, the Pennsylvania railroad company, Philadelphia, Wilmington and Baltimore railroad company, Pittsburg, Cincinnati and St. Louis railway, Lake Shore and Michigan Central, New York, Chicago and St. Louis railway company, Fort Wayne and Chicago railway company, and Pittsburg and Lake Erie railway company, defendants.

Mr. Cassidy recites that these corporations form what is known as the trunk line pool, and further shows that the trunk line contracts and the other contracts and agreements not only tend towards but have actually formed a very extended monopoly composed of the said companies and corporations respondent; that said monopoly lacks publicity, legality and responsibility to law; that said contracts are in restraint of trade and the common carrying facilities of the commonwealth and in derogation of the equal rights of all individuals, associations and corporations to have persons and property transported over railroads; that, being a combination to fix their charges and control the business of competing lines of railroads, they tend to prevent fair competition, and result in unjust discrimination, in charges and facilities for transportation, and that for these reasons the said contract and the monopoly thereby formed are unlawful, injurious to the community and public policy, and prejudice the public and oppress individuals by subjecting their business, trade and comfort to the parties forming that said monopoly, and infringe upon the equal rights of individuals and the general well being of the state. He further contends that they violate article 17, section 4, of the constitution of the commonwealth by practically consolidating competing lines by placing parallel and competing railroads, in part at least, under the control of other parallel and competing lines, and by making the officers of certain railroads act through said parties and committees thereof, as officers of parallel and competing lines, and in other respects violate the provisions of said article. The said attorney general, on behalf of the commonwealth, therefore prays that such orders may be made as may be necessary for the service of process on non-resident defendants.

Second.—That the defendants and each of them may be required to make full discovery of all and singular in the present case, and especially of the contracts and agreements above mentioned, and all other contracts, agreements and arrangements whatsoever of a similar nature between them or any of them.

Third.—That the said trunk line contract and the several contracts and agreements above mentioned, and all other contracts and agreements and combinations whatsoever of similar nature between the said defendants or any of them, may be declared unlawful.

Fourth.—That the said defendants and each of them may be enjoined by the injunction of this court, especially until a hearing—and perpetual thereafter—from carrying out or acting under said contract and agreements, and each of them and any similar contracts, agreements or understandings, and from entering into any further contracts or agreements of that nature, and forming and acting under or in connection with any such combination.

Fifth.—Such other further or different relief as may become necessary or proper.

Appended to this are the contracts and agreements entered into by the members of the trunk line pool, including the organization and rates. A bill against the pool was also filed, with the following defendants: The Philadelphia and Reading railroad company, the Philadelphia and Reading and Iron company, Stephen A. Caldwell, George De B. Keim and Austin Corbin, receivers of said companies; the Lehigh Valley railroad company, Delaware, Lackawanna and Western railroad company, Delaware and Hudson Canal company, Pennsylvania railroad company, Pennsylvania coal company, New York, Lake Erie and Western railroad company, Lehigh Valley coal company, Susquehanna coal company, Mineral railroad and mining company, Summit Branch railroad company Lykens Valley company.

The coal pool meetings and the allotment of coal made to each corporation are detailed, and then Mr. Cassidy says: By this action gross discrimination has been, and is, exercised against the consumers of coal residing in or doing business within this commonwealth. The price of coal to consumers within this commonwealth has been fixed at nearly

30 per cent. above the price charged for similar coal at the same point when purchased for shipment beyond the bounds of the state. The market price of coal in cities outside the state and much more remote from the mines has, by reason of said combination, been below the market price in cities within the state and nearer the mines, and even in cases of cities far remote, the increase in price has not been at all commensurate with the additional cost of transportation. The said combination by hindering competition has restricted the development of the state; it has advanced prices both for coal and transportation artificially to such an unjust extent by restricting production, and by advancing prices it has crippled vast industries and seriously injured the prosperity of the state. By ordering the suspension of mining it has caused large numbers of workmen to remain idle a considerable part of the year, and the attorney general further informs the court that the said respondents have thus unlawfully and as well in violation of the constitution of the commonwealth, and as against public policy and to the injury of the public, combined and agreed arbitrarily to fix, limit and regulate the supply, and fix, raise and control the price of an article of general consumption, which has become and is a necessary of life, and in pursuance of said combination and agreement have, and are continuing to arbitrarily fix, limit and regulate the supply, and fix, raise and control the price to the general public of an article of general consumption, which is a necessary of life. Therefore the said attorney general on behalf of the commonwealth prays that the said defendant and each of them may be required to make full discovery of all contracts, agreements and books of account and all other written or printed papers, resolutions, stipulations, notices and directions in or about the premises.

That the said anthracite coal combination may be declared to be illegal and the agreement entered into on December 31, '84, and all other agreements between the defendants or any of them of the nature above set forth, may be declared void.

That the defendants and each of them may be enjoined by the writ of injunction of this court, especially until a hearing—and perpetual thereafter—from carrying out said agreement of December 31, '84, or any similar agreement, and from uniting and confederating together to restrict the production of coal or the amount thereof to be marketed, of the time during which coal mines or any of them may be worked or for regulating the price to be charged, collected or paid for coal, and especially from discriminating in their prices within this commonwealth or in any part thereof.

Such other or different relief as may be or become necessary or proper for the premises.

The court fixed Dec. 21 as the day on which to hear argument on the preliminary injunction.

MINE VENTILATION.

Its Theory and Practice as Demonstrated by an English Student.

From the English Labor Tribune.

Oxygen is absorbed during the operation of breathing, and also by the chemical decomposition of organic and inorganic bodies. An ordinary man makes twenty respirations per minute, each of 40 cubic inches, so that the quantity breathed during that time will be 800 cubic inches, or 28 cubic feet per hour. The lungs do not absorb nitrogen, and only '03 of oxygen, so the expired will contain '79 nitrogen to '18 of oxygen by volume. The '03 of oxygen are replaced by their equivalent in carbonic acid gas by water vapour. Thus 150 men working 8 hours in a mine will respire 33,600 cubic feet of air, absorbing in the act of respiration 1008 cubic feet of oxygen, and restoring to the mass a similar volume of carbonic gas, and nearly 3792 cubic feet of nitrogen, which is over the proportion in air. The combustion of the substance used for lighting is also at the expense of the air, the products being carbonic acid gas and water vapor. Lamps used as those used in coal mines require, on an average, 8 cubic feet per hour. The most of combustible minerals, and notably coals, undergo certain changes when exposed for some time to the atmosphere. Their alterations have not, as yet, engaged the attention of chemists, but they are readily demonstrated by the deterioration and disintegration of some kinds of coal. It is thought that they undergo slow combustion, absorbing oxygen from the air and whose chief products are water, vapor and carbonic acid gas. Also the decay of the wood used in the mine, and especially of the timber which takes place in the case of certain conditions gives rise to carbonic acid gas by the union of the oxygen within the air with some of the vegetable elements and also to many compound gases. The one result of the oxygen is to set fire in mass an excess of nitrogen, which altogether it may per se have no injurious influence on the animal economy, impoverishes the air and renders it irrespirable and exorable to support combustion. A mixture containing less than 15 per cent. of oxygen will not support life. If oxygen was entirely left to itself and exert its native principles it would melt the hardest substance and set everything in flames it came in contact with. It would also acid support its flames. Water would have no power in extinguishing it, but would help on the conflagration. Some of our most eminent men have formed the opinion that in this way

the earth may be consumed at the last day, when the author will separate nitrogen and leave oxygen alone remaining. The abstraction of the oxygen of the air and its union with the aforementioned bodies gives rise to many compound gases, carbonic acid is the most insidious and destructive gas encountered by miners. Air containing more than 10 per cent. of this gas will not support combustion. Miners cannot breathe, without danger, air that contains more than 8 per cent. of this gas. Even in less proportion it has without doubt very bad effects, but there is no danger of suffocation. This gas acts on persons who breathe it, as a poison; suffocation quickly takes place, preceded by pains in the head and eyes; it takes away all strength, limbs become heavy and powerless, a death-like sickness, but without pain, comes over him, and he quietly passes away as in a sleep. It is frequently evolved in great abundance from fissures and cavities of the earth. Most mineral waters contain large volumes of it, which they evolve into the air. It is often found in sinking pits. Coal seams, at a depth of 60 fathoms, are noted for containing a great quantity of this gas, and also when seams are worn out, considerable volumes of it are given off. Therefore, all old workings ought to be made secure; or, if approaching them, great caution should be used, as they are frequently filled with this gas, which, if incautiously tapped, would cause great destruction of life. As for ventilating mines, there should always be sufficient to carry it away and keep the workings well aired. I will here refer to two outbursts of this gas which I know to be correct. The first was on November 13th, 1843, at the Low Main Seam, Walker colliery. On this occasion a mass of coal was displaced weighing about eleven tons. A discharge of gas ensued; the two men working in the place secured their safety lamps, one of which was extinguished by the gas, and the other partly covered by a fall of coal, drew down the wick with his pricker and hastened to apprise the other men in the pit, extinguishing their lamps as he was proceeding along, and then finally retired to the shaft. The contents of the airway was fouled to the extent of 42,000 cubic feet in the space of half an hour. In two hours afterwards a trace of gas could be found. The air in this part of the mine was traveling at the rate of 624 feet per second and a volume of 12,000 cubic feet per minute. Had there not been a powerful ventilation the 320 men and boys would no doubt have suffered by this sudden outburst of gas. A second took place on December 10th, 1848, at the same colliery. A fault had been crossed and coal worked without any gas being visible until a fall of roof took place. Then a violent noise was heard like the blowing off of steam, and a heavy discharge of gas took place, which fouled airways to the extent of 86,300 cubic feet. At 400 yards from place of issue a deputy saw his lamp fire, and cautiously drew down the wick. He retreated slowly the gas following, and continued to burn in his lamp for ten minutes and then died out. At 640 yards from the spot the foulness was met by four men and boys, who immersed their ignited lamps in water. The air was about 16,000 cubic feet per minute, and overpowered the discharge. In three hours no trace of gas could be found in the workings save only at the point of issue.

[TO BE CONTINUED.]

The Black Diamond Colliery.

The Black Diamond mines at Luzerne Borough, Pa., which have been operated for about one year by J. C. Haddock, of New York, produced an average of 830 tons of anthracite per day during October, and this output will be increased by improvements soon to be made. Mr. Haddock leases about 270 acres, and coal is being taken from the Cooper and Bennett seams, the former is 18 feet deep, and the latter is seven feet of fine coal. The Bennett lies 58 feet deeper and also has a thickness of seven feet. A new slope located in the Bennett has a length of 2,200 feet, and by this opening and the main shaft coal is taken to the surface. A tunnel connects the Cooper and Bennett, which is worked as a plane. The second opening, size 10x10 feet, was finished some months ago, and is used only as an airway. In the spring the main shaft, which is 10x22 feet in the clear, will be sunk down to the Ross seam, which lies at a depth of about 520 feet. It has not been decided whether the shaft will cut the Red Ash deposit, which is sixty-five feet below the Ross seam. This seam may be developed by a tunnel to be driven through the rock. The Ross has been proved at twelve feet in this vicinity, and the Red Ash shows fourteen feet of clean, showy anthracite.

MINE ACCIDENTS.

Thomas Brennan, who was injured in Franklin mine, Lonaconing, Md., by being squeezed, died from the effects on the 4th.

John Alexander, a young man, was struck on the head by a chain at Hazledell colliery, Centralia, Pa., on the 8th and killed.

Thomas O'Connor, aged 13 years, was killed on Saturday by falling into the screen at Coal Brook colliery, Carbondale, Pa.

Patrick McGlynn was caught and killed by the descending cage at Greasy Island shaft, Peckville, Luzerne county, Pa., last Saturday.

On Saturday one of the boilers of Pinedale colliery, near Middleport, Pa., burst. A young man named Keim was killed, John Ott was fatally injured and another was severely scalded.

ON SAFETY LAMPS.

WHAT IS REQUIRED OF THEM AND WHERE THEY HAVE FAILED.

Tests of Various Manufactures Made by the English Commissioners on Mines—Conclusions Arrived At.

From "Transactions of the Mining Institute of Scotland."

Lamps should be unable (1) under any circumstances likely to occur in mines to cause ignition of inflammable mixtures, even when passing at very high velocities; and (2) should yield a bright and steady light for a working day. They should be simple in construction, and not readily put out. If complicated there is greater risk of their being imperfectly fitted together, and of defects passing unnoticed; and if easily extinguished a strong temptation is offered to the miner to provide himself with the means of obtaining a light. The readiness with which lamps show gas is of importance, and it is desirable when gas is indicated in dangerous proportion that the workmen might have the means of extinguishing all flame. Appliances for completely shutting up the lamp, if simple and reliable, the commissioners regard of considerable consequence.

Lamps that best satisfy the first condition are, of course, those which are entirely independent of the surrounding air. The light in the lamp applied in connection with the Fleuss diving apparatus—which has been used for penetrating mines after explosions—is derived from the incandescence of a cylinder of lime heated in a spirit flame fed with pure oxygen, contained in a reservoir at considerable pressure. It is entirely unsuited for regular work underground because it is both complicated and heavy, and should only be used by skilled men. Electric lamps, connected by conductors to the dynamo, have been used to some extent about pit bottoms and in main roads, and attempts have also been made to use them at working faces; but to be practically employed for the ordinary work of the miner they must be portable and self-contained, and therefore independent of conducting wires. The commissioners have examined several lamps of this class, some with primary and others with secondary batteries. The only one actuated by a primary battery that approached the necessary conditions was submitted by Mr. Blumberg. It weighed 4½ lbs., and was contained within dimensions measuring 6½" x 3½" x 3½". At the beginning it gave a light of 0.92 of a candle, and after burning for 8 hours it had fallen to 0.22 of a candle. Others by Coad, Swan, and Pitkin ceased to give any light after 5½ hours. Of these lamps two gave sufficient light for 4 hours, and as they only require the addition of the exciting fluid to put them in action, they form better lights than the lamps of Fleuss for exploring purposes. The best results, have, however, been got with secondary batteries by Mr. Swan. Three of his lamps were tested. They weighed from 9 to 1½ lbs., and measured 7½" high by 4½" diameter. The best at starting yielded a light of 2.74 candles, and after 10 hours it was equivalent to 2.09 candles, and after burning 12 hours it gave 1½ of a candle, or double the light of a Davy lamp. Stress has been laid on the fact that electric lamps give no indication of the condition of the air in a mine; but their batteries can evidently be easily used for the heating of platinum indicators, and it is stated that Mr. Swan is presently engaged adapting a simple form of Liveing's instrument to his glow lamp.

Reverting to lamps fed with the air of the mine: When Davy invented his lamp probably the currents in mines seldom exceeded a velocity of 300 feet per minute. In such circumstances probably his lamp, and also the Clanny and Stephenson, were quite safe. Statistics collected for the commission show that now the usual velocity in the working places is from 120 to 360, often rising to from 420 to 720 feet per minute (at Blantyre and Cadzow the greatest speed of air in working places is given at 530 and 415 feet respectively) while in main airways currents of 600 to 2280 feet per minute are met with. In shafts, fan drifts, and dumb drifts current velocities are met with of from 1200 to 2000 feet per minute, and Mr. Hewlett, of the Wigan coal and iron company, gives the highest velocity in an airway at 3525, at a regulator, 5010, and in an upcast shaft, in which men descend with lighted lamps at 6030 feet per minute, equal to 68 miles per hour.

It had been demonstrated by others before the labors of the commission began that of these high velocities the Davy, Clanny, and Stephenson lamps were all unsafe.

In most lamps when placed in an explosive current the wick flame is extinguished in a few seconds while the gas mixture continues to burn; in certain lamps the ignited gas was also extinguished in short time. Such lamps would be absolutely safe but this extinction of the gas flame did not hold with the same lamp for all velocities, and it was found by the commissioners to be a condition that could not be insured. When gas burns in a lamp it should be shielded from the current, and it should be arranged to burn as far distant as possible from the glass so as not to crack it.

The commission records about 2000 experiments

made with over 250 different lamps; only the general results can therefore be noticed here. As far as possible experiments were made with two or three different lamps of the same kind so as not to hazard an opinion from the action of one.

They were tested in a wooden channel 20 feet long having a cross-section 13½" x 10". A current was produced in the box by a Korting blower passing steam at 60 lbs. pressure. The maximum current obtainable was 1,600 feet per minute. Observation of the behavior of the lamp was made through a glass window in the box, on the top of which there were loose pieces to relieve the explosions. By reducing the breadth of the channel from 10 to 4½ inches, velocities of 3,500 feet per minute were produced. Gas was introduced into the air from a vertical pipe, and measured by meter, and rigid tests were applied to ascertain that it was in the proper proportion and thoroughly diffused in the air. In some of the trials the lamps were inclined on a table and the behavior of some of them was tested in oblique currents by directing the air on them by means of inclined screens or shields. By inserting a partition in the main channel, and causing the current to pass up a vertical conduit along a short horizontal channel and down into the main box again, it was possible to test the lamps both in ascending and descending currents.

All lamps were submitted to three tests—1st, in natural gas at Garwood Hall colliery, near Wigan, in explosive currents containing 61 per cent. blow gas (= 5.46 marsh gas); 2nd, in natural gas Llynypia colliery, in the Rhondda valley, in currents containing generally 12½ to 13 per cent. mine gas (= 5.30 and 5.52 marsh gas), and 3d, at Woolwich, in explosive currents containing 8 per cent. of illuminating coal gas.

[TO BE CONTINUED.]

Running Without Smoke or Sparks.

The Boston Herald reports an interview with R. L. Walker, the inventor of a firing apparatus which prevents smoke and sparks, from which the following is quoted:

"Smoke and sparks," said Mr. Walker, "are simply evidence of imperfect combustion. That's the problem in a nutshell. The need of a device to consume smoke and sparks is apparent to any one, and I think I have solved the problem. This imperfect combustion necessarily implies waste of fuel, and consuming smoke and sparks adds to the motive force of the fuel. As applied to locomotives its value is apparent. It means comfort in traveling, economy in fuel, and safety from fire by sparks from a locomotive, such as will cost thousands of dollars' loss every year."

"How is it done? Is the process an expensive one?"

"Not at all. The alterations are in the fire-box alone. The fire-box is divided longitudinally by a water-leg, thus practically making two fires, which are cemented by a throat in the forward end of the water-leg. Some thirty inches above the grate bars a corrugated brick arch is built over both fires to within thirty-six inches of the doors, where a throat is formed through the combustion chambers and leading to the tubes of the boiler. In the centre of this throat is hung a wrought and cast iron water damper, which can be manipulated at will by the fireman and which controls the direction or circulation of the currents or draughts to the fires. These fires are cooled alternately."

Supposing the right-hand fire has just been replenished (the damper being down on that side) the smoke and sparks made are carried through the water-leg and must pass over the left-hand fire, which is in an incandescent state, and mixing with the heated oxygen are burned, the corrugated brick arch causing any flying cinders to be deflected downward into the fire. When the left-hand fire wants coaling, the damper is reversed and the operation is in the opposite direction."

This system has been tried on several roads with success, Mr. Walker says.

MINING NEWS.

The discovery of gold near Oklahoma, in the Indian territory, is reported. About 300 claims have been staked out and are worked.

A company of Americans has been formed for washing a hill of gold-bearing gravel near Santo Domingo, Chihuahua.

Dispatches from Adelaide state that large findings of gold have been made in the South Australian diggings in the region of Teetulpia, and that 5000 men are already congregated in that one locality. The largest nugget yet found is said to have weighed thirty ounces.

Hungarian miners failed to work the mines in the northwest territories. A number employed on the Saskatchewan mines proved worthless, and Scotch and English miners had to be sent for.

THERE is an enormous power stored in coal. Prof. Rogers makes the statement that the dynamic value of one pound of good steam coal is equivalent to the work of one man, or, in other words, that three tons represents the power of one man's hard work for twenty years counting three hundred working days to the year. A four foot seam is estimated to yield one ton of good coal to the square yard, or 5,000 tons per acre. One square mile, therefore, of good coal bed would represent the labor of over one million of men for twenty years.

FORMATION OF COAL.

A French Scientist Theorizes on the Agencies That Created the Great Mineral.

The *Bulletin de la Ceramique* has lately dealt with a theory regarding coal formation which it rightly or wrongly considers of sufficient originality to merit treatment of a detailed character, while the facts are said to reconcile features of the more ancient theories with results obtained by modern experimental science. Ideas of a more or less novel kind have from time to time been put forward by French writers with regard to this subject. M. Gennette asserted that coal is produced from a certain sandy earth which he names agas, while M. de Gousanne regards it as clay mixed with sufficient bitumen and sulphur to render it combustible. In further illustration of his theory, he quotes the fact that none of the ligneous products with which we are acquainted can, strictly speaking, be called coal; referring specially to lignites, etc. Buffon has indicated the fact that coal deposits are situated in places which were at one time covered with water. Following out this idea, M. de Grand' Eury argues that the water of such seas or lakes was heated by the earth's caloric properties and by the sun. The atmosphere being charged with carbonic acid, there was in these waters an enormous production of inferior vegetation which absorbed the carbonic acid of the air and became decomposed by the want either of water or of oxygen. A sort of vegetable jelly will thus have been formed which, gradually losing its humidity, transformed its carbon into ulmic hydro-carburetted substances; to become successively transformed into asphalt, petroleum, naphtha, earth pitch, bitumen and finally coal.

This principle is opposed to the idea that large trees and shrubs produced coal, and in further support of this theory it is stated that the carboniferous flora consisted of plants deficient in substances necessary for producing coal, the investigation of M. Gaston de Saporta on this point indicating that this vegetation consisted of a relatively thin circle of wood and of a large quantity of a softer substance. Brogniart and Elie de Beaumont attribute the formation of coal to the transformation of the close herbage vegetation which surrounded the larger forest trees and plants. Similar opinions have been expressed by M. Poncelet and other savants, so that M. Grand' Eury has more or less eminent authorities for his statement that a calculation of the accumulation of trees, etc., necessary for the conversion into even a thin coal bed of a forest suddenly buried under water, or gradually letting its residue gather on the ground, leads to an evidently erroneous result, so greatly is it necessary to exaggerate either the mass of vegetable matter or the duration of the process of coal formation.

Even admitting for a moment that coal is produced by the decomposition of trees, M. Grand' Eury asks how it can be maintained that wood in losing its moisture has become liquid. Wood is known to contain a good deal of water, and coal has only traces of it; while he regards it as certain that coal was at one time liquid and gradually assumed a solid shape, he considers that coal beds were formerly beds of naphtha and bituminous petroleum, produced by the decomposition of inferior aquatic vegetation under the influence of heat and dampness. As a proof of this assertion, he quotes the fact that the porous minerals found at the bottom of coal-pits are impregnated in their pores with naphtha and petroleum. This is immediately detected by their odor (particularly with the porous minerals of lithoidal carbonate of iron), and it is therefore argued that this naphtha could only have been absorbed during the first state of coal formation. It is further remarked that this theory serves to explain the formation of petroleum, asphalt and other bituminous springs, which are found at various depths and even at the bottom of some lakes. A porous soil would allow of filtration, and hence M. Pongas has remarked that in calcareous districts the coal found is usually of poor quality.

In further defense of the hypothesis that coal was once in a liquid state, it is urged that canal coals float in the same way as resin, and can be used like a torch or flambeau. Another proof is the fact that the lighter substances (turfs, lignites, etc.), are on the top. Various proofs are furnished by the absence of similarity between the ashes of wood and coal that the two substances are not so closely connected as has been thought to be the case. The presence of fossil imprints or plants is explained by the fact that these imprints are in the earthy and schistous portions of the mines and not in the coal itself. The trunks of trees which are sometimes found are not coal, properly so called, and retain certain properties of wood. The waters in which there grew the vegetable substances to which reference has been made, contained (like such waters at the present time) carbonate of lime, carbonate of iron and alum. Hence the presence of these salts in certain kinds of coal is explained. These interesting facts, quoted by Mr. Paul Noel, are possibly not altogether new, but in any case deserve attention.

Anthracite coal is scarce at all the interior points,

MINING IN ENGLAND.

The Depression It is Suffering From and the Causes of the Same.

The royal commission on the depression of trade has just issued a third report giving evidence taken at fourteen meetings which have been held in the months of March, April and May. Some important evidence was given with regard to the severe depression in the mining industry by the representative of a firm producing 2,000,000 tons of coal a year, and employing 10,000 people. The explanation of mining depression stated was as follows:

The mines act of '72 had the effect of checking production, less coal being got while the demand increased, which brought about a high rate of fuel charges in '73 and '74, and caused large outlays in re-opening disused mines and opening new ones. The result was that the production before long became greater than the demand, and the prices of fuel had fallen pretty nearly ever since. The coal fields had not on an average been working more than four days a week during 1885, while in some foreign countries, including France, there had been a progressive increase of production. In Germany the output had increased from 36,292,000 tons in 1873, to 55,000,000 tons in '83, and in the United States of America alone the increase in 10 years, commencing '73, had been nearly 30,000,000 tons. The wages of colliers in the United Kingdom had increased between 50 and 60 per cent. between '72 and '84. In '68, they were at their lowest point, and at the present time, '86, wages were about the same as in '68. The average wages of a collier now would be about four shillings and nine-pence a day clear.

Few men in England are better able to give better evidence on mining matters than the witness from whose statement the foregoing facts have been taken; the writer of these notes knows him well, having spent nearly 20 years in his service, and in taking exception to a part of the argument the exception will be taken cautiously. The passage through parliament of the mines act of '72, which was essential to safety and which has had the most blessed influence, did not check the production of coal in England. It is hardly correct that less coal was got while the demand increased. The official returns shows production as follows:—103,000,000 tons in '68; 107,500,000 tons in '69; 110,500,000 tons in '70; 117,350,000 tons in '71; 123,500,000 tons in '72—the year in which the mines act came into operation—and in '73, being the year after the production had still further increased to 127,000,000 tons. Then it is said less coal being got while the demands increased brought about a high rate of fuel prices in '73 and '74, which caused large outlay in re-opening disused mines and opening new ones, with the result that the production before long became greater than the demand. But we find from the official returns that in '74, being two years after the mines act had passed, the production had actually fallen to 125,000,000 tons, and whilst in five years, from '68 to '73, including two years under the mines act, the annual production increased over 20 per cent.; in another period of five years from '73 to '78, when it is said the re-opening of disused mines and opening of new ones had caused an enormously increased production, the annual increase was only about four per cent. And even taking two periods of 10 years each, we find, from '64 to '74, an increase of 35 per cent., and from '74 to '84 an increase of only 28 per cent. It does not appear from official statistics that the mines act of '72 checked the production, nor does it appear that the consequent re-opening of disused mines and opening of new ones made the rate of increase greater than in previous years.

In '70 and '71, we had the great war between France and Germany, in which were engaged not thousands or even hundreds of thousands merely, but millions of men, comprising the entire population almost of the two nations. Their industries, so far as home effort is concerned, were at a stand in those years. The end came, France was conquered and a tribute of \$200,000,000 was exacted by the Germans. Both nations had lost ground to recover, and ravages to make good. Germany had \$200,000,000 to spend, and France, having thrown away one form of government and established another, rose like a phoenix from the ashes of defeat and commenced work of all kinds in every direction. America, too, had altogether recovered from the terrible effects of its civil war of four years' duration, and the three great nations of France and America and Germany became customers of England. Iron reached fabulous prices and coal followed. But very soon the demand lessened, and France and Germany and the United States saw the importance to them of developing their own resources. All had coal, all had the material for making iron, and all had these materials under advantageous circumstances in which England was deficient. Their demands have been very much reduced and their productions have very materially increased, and they now not only supply themselves, but compete with England in neutral markets, and the heaviest blow of all, in some instances undersell England in English markets. The fact is, that

the old country cannot hope to stand so much ahead of other lands in the future as in the past. The principal European countries, and the United States of America and our colonies, and even great dependencies like India, are now, or will be, in the race with us. It will require all the talent and energy we possess, and a thorough re-arrangement of the existing burden of excessive mine royalties, to enable England not to regain her once pre-eminent position, but to recover some of the ground she has lost.

The same witness gave lengthy evidence on the subject which the writer of these notes hold very strong views upon, and has discussed in various numbers of the *Indian Engineer*—namely, mining royalties, and no man could be considered more competent to express an opinion, the firm of which he is now and has been for 21 years managing director, having at present on its books nearly \$300,000 overpaid mine rents representing 12,000 tons of coal which have not been got, but which the mine owner has been paid for. It was stated that the average royalty upon coal in England was now about 10 per cent. of the selling price, whereas in France and Germany and Belgium, the royalty was based upon the profits; and whatever the selling price, the royalty never exceeded five per cent. of profits realized in working the coal.

This condition of things, as was very well said, tended to depression of mining and iron industries of England, because it placed foreign countries in a position of considerable advantage, and enabled them to compete on very unequal terms. But in addition to mining royalties, that the royalties based upon so much coal at so much per ton, English colliery workers have to contend with a *dead rent* always fixed and that dead rent merges into the royalty. If a lease is taken from a mine owner, he will probably ask £1,000 a year and six pence per ton royalty, and £1,000 a year must be paid if no coal at all is got. It may be said that the colliery proprietor can recoup himself against overpaid rents in one year by an overproduction in another year, that is to say, if he produces £500 worth of coal in one year, and pays £1,000, he can produce £1,500 worth of coal the next year and still pay only £1,000. But that arrangement is governed by the length of the lease and by the termination of the lease, and it has been submitted fairly enough that, where a lessor has been paid for his coal, and the lessee has not been able to get it during the lease, the lessor ought to allow a longer term in which to get the coal for which rent has perhaps been paid for years. The witness mentioned his own firm which has overpaid mine rents to the extent of one-eighth of its capital.

A colliery company in England which went into liquidation a few years ago, had overpaid in mine royalties nearly £100,000, and the mine owner has leased again the very coals for which he has already been paid. It has been urged over and over again, why enter into contracts of so unfavorable a character, and the explanation is very simple. If all the coal in England belonged, as it does in France and Belgium and Germany, to the state, there would of course be only one landlord with whom the colliery worker would have to deal. But in England some counties, at any rate Lancashire notably, mine owners are most innumerable, and a colliery which leased say 20,000 acres would probably have a couple of hundred leases, each one having a certain fixed rent attached and probably no coal at all is being got from quite a number of the properties. And yet all the leases must be taken and all the properties held, in order to get the coal regularly, or else the colliery proprietor would have to cut round little bits of property in a way that would not pay at all. What the witness seems most pressing about was that parliament should so enact that if a mine lease is taken for 25 years, and £100,000 is paid for coal, but only £50,000 in coal produced, time ought to be allowed to get the coal representing the overpaid £50,000.

As things now are that amount would be entirely lost, and their need be no fear that when the English people and the English parliament are thoroughly roused, that reform will be accomplished.

But this, important as it is, is only a very thin end of a very thick wedge; mine rents, whether as dead rent or royalty, all over England demand substantial reduction, and although it is desirable, wherever possible to avoid interference with freedom of contract, mine ownership is a monopoly, and not only can, but has operated and is operating injuriously to the entire nation. If mine owners will not enormously lessen their charges and allow new ones to rise and fall with the market, mine royalties in England will provoke an agitation in parliament, just as the land in Ireland did, and will be settled in the same way by establishing a public tribunal with power to determine fair mine rents.

It was mentioned that the European countries already had another great advantage in the payment of low wages, the differences in colliers' wages being three shillings and four pence as compared with four shillings and nine pence per day. English colliers do more work by day wages, and the real question is not whether English colliers are paid more money for a day's work, but whether they are paid more for the same amount of work. Till that question has been satisfactorily solved, the writer will venture to mildly dispute the statement that an English miner receives more money for the same amount of work than any miner either in Europe or other parts of the world. At any rate, both employers and employed are agreed that miners' wages in England are quite low enough, and no relief to trade must come from that quarter. It was also said that the mines regulation act of '72 increased the cost of the production of no less

than eight pence per ton. This might be so in '72 when coal was selling, not as now, at from five to six shillings a ton, but at twenty shillings a ton, and wages and cost of production were matters scarcely worth consideration, because every ton of coal then realized a much larger profit than the present market price. But to say that the operation of the mines act imposes eight pence a ton now can scarcely be accepted as correct. As a matter of fact, any slight increase in the cost has been more than counterbalanced by the additional safety, and in mining safety is the greatest economy.

The employers' liability act of '80 is also brought in and charged with entailing increased cost. We are told that a company producing 2,000,000 tons of coal a year has its expenses increased £1,400 a year by the operation of the employers' liability act which represents about three-half pence a ton; and as a set-off, there are no claims from workmen for compensation, and certainly this is not a bad investment in an industry in which one-fifth of the people employed are killed or injured in a year. Then an attack is made upon railway rates, and here colliery proprietors do seem to have good grounds of complaint. The various railway companies have formed a kind of "ring," and the effects are not beneficial to the coal producer.

Grievances of this kind have caused two governments and the presidents of the board of trade to introduce a measure establishing a court of jurisdiction with power to determine fair rates and charges by railway companies. The last proposal retired with the government that had brought it forward, and has provoked such a storm of opposition that when it reappears, it will probably have undergone extensive alteration. But whatever the amendments, a railway tribunal would relieve mining and iron and other industries of burden and do no injury to railway property.—C. M. Percy, in *Indian Engineer*.

LABOR TOPICS.

The miners at the Risher pit, on the Monongahela river near McKeesport, Pa., are out on strike against being compelled to cut clay veins without extra pay.

The men on strike at the Hillside colliery, Moosic, Pa., ask others to keep away until the strike is settled; they want pay by the ton instead of by the car.

All the miners in the Coalton, Ohio, district (2,500 to 3,000) struck on the first because of the refusal by the operators to grant an increase of five cents per ton for mining. A long siege is expected as both operators and miners seem determined.

The town of California, on the Monongahela river, Pa., has hitherto been a stronghold of non-unionism among the miners, but it has been captured at last by the Knights of Labor, who organized there, on the 27th, an assembly with thirty charter members.

The miners at Morrell, in Connellsville, Pa., are satisfied with the present condition of affairs with the exception of scales. They fill their wagons according to the measure of the inspector, forty bushels at the water level, and claim that the wagons, which are hauled from 200 to 400 yards by mules and brought up a 5,000-ft. slope at a rate of 8 or 10 miles an hour are shaken down when they reach the tipple, and that in consequence the miners are docked from two to four bushels. The men complain of this and say that nothing short of the establishment of scales will satisfy them.

The Coal Fields of Europe.

A German paper publishes some interesting statements regarding European coal fields still unexplored, and add estimates of the probable exhaustion of their supply. In Great Britain the chief coal districts—namely, Newcastle, South Wales, and the Clyde county—yield about one hundred and seventy million tons per year. Taking last year's consumption as representing the average annual consumption for many years to come, the journal named that the British coal mines will not be exhausted in less than from 600 to 800 years. In Germany the coal industry is more favored than in any other country in Europe. It is calculated that drawing upon only one of her fields—to wit, the Westphalian—Germany will not be able to exhaust her coal in less than a thousand years. She has, in addition, the riches of the Bavarian, the Aachen, and the Silesian coal districts. It is thus evident that Great Britain and Germany alone—to say nothing of France, Austria, Denmark, Russia, Sweden and Italy—are able to supply Europe with coal for a period which makes all speculation about the coming exhaustion of the coal supply, to say the least, highly premature. To suppose, moreover, that a thousand years hence the industrial operations of the world will be still depending upon the coal supply is to put even less faith in the resources and the future of science than would have been reposed in them by a man predicting in the days of primitive writing the inevitable exhaustion of bark.

Contrary to expectation, the 400 miners at the Excelsior mine, in the Shoshonok, Pa., region did not start to work. The younger element is opposed to returning to work unless operator Robinson grants the ten per cent. advance, while the married workmen, who have been impoverished by the five weeks strike, are anxious to return on the five per cent. offer. The operator is putting the mine in a workable condition, and it is likely the strike will be broken by the married men,



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FOR THE WEEK ENDING

SATURDAY, DECEMBER 18, 1886.

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THE TRADE OUTLOOK.

Despite the renewal of the tariff agitation in congress, a reaction in the price of stocks and indications of a panic on the Pacific coast, the general tendency in the markets is towards an increase in both consumption and production and a strengthening of confidence in the future of general business. This is to a large extent accounted for by the increase in the currency during the current year and the almost absolute certainty of an equal if not greater increase during '87. In the four months from August 1st to December 1st, the net addition to the currency in circulation amounted to about \$40,000,000, and the increase during the current month will, perhaps, be proportionately greater. Gold continues to come from abroad and the coinage of silver adds upwards of \$2,000,000 monthly to the aggregate volume of the currency. This money has not been added to the bank reserves, but has gone into the channels of legitimate trade, and the result is seen in higher prices and unusual industrial activity.

The tariff agitation has not disturbed the industrial situation to any appreciable extent because the public do not fear it. Mr. Morrison proposes to call up his bill in congress today for a vote, but there is even less likelihood of its passage than there was a year ago. It is possible also that the effort to secure the suspension of silver coinage may be revived, but the possibility of its accomplishment is hardly worthy of speculation. A bill with that purpose concealed behind an ostensible proposition to make silver coinage free has already been introduced, but its purpose is so apparent that it is unlikely to deceive any one in or out of congress. The measure proposes to put silver coinage on a level with gold, but gives the secretary of the treasury the right to suspend the silver coinage at his pleasure. Since the secretary is hostile to the coinage it is easy to see that the object is to give him the power to suspend it indefinitely. On the whole there is no reason to fear the enactment of any legislation inimicable to the interests of industry at the present session of congress, and, therefore, no reason why the business confidence which has been growing steadily during the past year should be disturbed.

The remarkable activity of the iron trade is the principle feature of the industrial situation. The present production of pig iron is greater than ever before, and is hardly equal to the demand. The increase in price during the year has been about two dollars, and while there is no disposition to boom prices there are many well posted persons who predict an advance of from 20 to 25 per cent. on current rates during next year. The Thomas iron company on Saturday last issued a card giving quotations two dollars a ton above the rates ruling on January 1, last. The company has eleven furnaces in blast against seven in December, '85. A year ago they had iron on hand, while during the past four months they have found it difficult to fill orders. They have booked orders already for 111,000 tons for '87, with customers who will require at least 40,000 tons to hear from. The company sold 40 per cent. more iron during the present year than in '85, and expects to sell 60 per cent. more this year, or the full production of their twelve furnaces. The total production of pig iron during the last six months of '85 was 2,379,053 tons; during the first six months of the same year the production was 2,150,816 tons, and for the whole year 4,529,869 tons.

The production of the first six months of '86 was 2,954,270 tons, and it is safe to say that the production for the last six months will be more than 3,000,000 tons and that the product for the year will be somewhat in excess of 6,000,000. Notwithstanding this great increase the price of iron has advanced and is still advancing.

Steel rails also have advanced within the past week from \$1 to \$2 per ton, the price now being \$36 per ton for heavy rails and from \$37 to \$42 for light weight rails at the mill. Railroad building has been carried on during the present year to an extent seldom equaled, and the prospects are that next year's mileage will be the largest ever known in the history of the country. The construction of the present year represents about 7,000 miles, as against 3,500 in '85. This accounts largely for the activity in the iron trade, and in a great measure explains the general industrial activity, as the money distributed for this purpose went into the purchase of other products and made consumers of persons who heretofore were suffering in idleness. The production of steel next year will be equal to the full capacity of the mills, and it is believed that American purchasers will be obliged to go abroad for their supplies before the end of the year.

The official announcement that the Philadelphia and Reading coal and iron company has no intention of leasing the collieries or in any manner parting with the control of the production and sale of its own coal, will be received hereabouts with mingled satisfaction and regret. Not a few people have been convinced that the leasing of the collieries to individuals would be an excellent thing, and they will be disappointed to learn that no such movement is contemplated. On the other hand there are those who reason that the coal region has been more prosperous under the company's management than when the trade was under the control of individual enterprise. This view is supported by the fact that during the last ten years the supply has always exceeded the demand and it was only by resorting to measures of restriction which individual enterprise could hardly accomplish that the price of the product was kept up to a figure warranting living wages to workmen. In the present and past condition of the trade there can be no doubt that the company can manage it more successfully than could a miscellaneous collection of individual operators.

ATTORNEY General Cassidy has filed bills in equity in the Dauphin county court against the trunk line pool and the anthracite coal combination, and has asked for a preliminary injunction against them. The court is asked to grant a writ of injunction restraining the defendant from carrying out the coal pool arrangement. The Attorney General, however, does not expect his prayer to be granted, and he does not believe that the coal combination has violated any law in restricting the trade as they have done. The bringing of the suits was a political move, conceived and executed in the interest of the Democratic party just before election, and in order to make a show of consistency he follows them up now by asking for injunctions. As a political card the movement was a failure, and the attorney general is no doubt thoroughly disgusted with it and with the people who failed to look upon it in the light he intended they should.

The city of Scranton is attracting considerable attention from manufacturers, owing to advantages it offers in cheap fuel and railroad competition. Recent inventions permit the millions of tons of coal dirt in that vicinity to be utilized in the making of gas, thus reducing the cost of fuel to merely nominal figures. Two large establishments with an employing capacity of at least 1000 hands will soon locate there. One of these is the Savage drop forge works, of Southington, Connecticut, and the other the Jersey City steel works.

England holds the first place as a foreign purveyor of coal to Italy. In 1880 Italy imported 1,737,747 tons of English coal; in '81, 2,073,315 tons; in '82, 2,180,020 tons; in '83, 2,351,002 tons; in '84, 2,605,051 tons; and in '85, 2,254,129 tons. While England sent Italy 2,254,129 tons of coal last year, the supplies received from Austria were only 55,505 tons, from France 138,404 tons; and from Germany, 70,000 tons.

INCONCEIVABLY vast areas of coal are still untouched, if careful mathematicians and geologists are to be credited. Europe has 3,500 square miles of coal, Great Britain 4,500, North America 100,000. England's deposits at present rates of depreciation will last a thousand years, those of America many times longer.

THE mine inspectors of the bituminous region of this state will report to Governor Pattison and Attorney General Cassidy that they believe 2688 cubic inches to constitute the standard measure of a bushel of bituminous coal, and they will enforce that measurement until otherwise ordered by the state authorities.

THE contemplated bituminous coal pool is wrestling with the problem of how to make 100 per cent. of tonnage stretch to 160 per cent., which is what the coaling shippers want. In behalf of their common weal, the latter ought to modify their respective demands.

THE Huns were not equal to the requirements of mining in the northwest, and have been superseded by British workmen. Thus one cheap labor movement fell through of its own weakness.

THERE is good authority for the denial of the charge that favoritism is shown in the distribution of cars in the Connellsville region.

FOREIGN COALINGS.

Up to the end of the year '84 ninety collieries had been opened in India.

Of the coal exported from Belgium in the first nine months of this year, 2,731,217 tons went to France.

The production of coal in the Austro-Hungarian empire last year was 7,370,000 tons, or 187,000 tons more than in '84.

The exports of British coal to France in September amounted to 334,645 tons, against 311,477 tons in the same month of last year, an increase of 7.4 per cent.

The exports of British coal to Germany amounted in the month of September to 314,926 tons against 239,985 tons in the same month of '85, an increase of 21.27 per cent.

Two Coke Trade Clouds.

Two small clouds darken the sunshine of coke trade prosperity. With these exceptions, the prospects were never more flattering. Scarcity of cars and threatened labor troubles are the only anxieties which the operators have for the immediate future. The latter has not yet interfered with trade, but the former has for some time seriously retarded it, especially in the west. The total shipments for November aggregate 24,100 cars against 23,100 for October. This decrease is due solely to the scarcity of cars. Of the total output, 17,750 cars were marketed by the syndicate and 6,250 by the independent operators. The output was distributed as follows: West of Pittsburg, 11,825 cars; east of the coke region, 7,000; Pittsburg and rivers, 5,275. Shipments east and west have each increased about 15 per cent. while Pittsburg shipments correspondingly decreased. No special cause can be assigned for this except the natural fluctuation of trade. In spite of the western increase, however, the furnaces there are in great distress and many have been compelled to bank down, among the latter are three furnaces at Cleveland, three at Chicago and nearly a dozen in the Mahoning valley. Pittsburg and eastern furnaces have managed to get sufficient coke to keep them going, eastern cars being more plentiful. The situation is a little easier, the western roads having by dint of desperate effort raised more cars for the trade. The scarcity of cars is not due to a diminishing supply, but to a big boom in the coke trade. It is estimated that the increase during the present year will amount to one-third. During the eleven months of the present year, for instance, the total western shipments are reported to have been 124,813 cars as against 98,000 for '85 and 89,000 for '84. It is estimated that the present month's shipments will be increased at least 8 per cent. over the shipments of December of any previous year. For these cars the roads receive from \$10 to \$50 freight. No average can be made per car. Of the shipments made so far this year 34,125 cars have been shipped to Chicago, 12,218 to Cleveland, and 40,000 to the Mahoning and Shenango valleys. The shipments east have increased in proportion and it is estimated that the car loads will reach between 50,000 and 60,000. The railroad coke pool has granted a larger proportion of cars to the coke business than to general merchandise. Even with this advantage the roads have only been able to put between 500 to 600 cars in the region instead of 900, which are needed. The difference is made in favor of the coke shipments because the factories and foundries must run. All the railroads are rushing the building of new cars as much as possible. They report that all the car shops in the country are full of orders and that their own shops are crowded.

Speculations on Reading.

The Reading syndicate seems to have developed irreconcilable inharmonies and it is being freely declared that the property will yet go under the hammer, though it is not expected that a sale can actually take place for at least a year. Others say that a decree will be secured as a means of coercing those who still refuse to assent to the reorganization plan, but that there will be no sale. If sold, it is believed that the property and franchises will bring about \$600,000. The Schenck navigation company of officials have given final answer that they will not make a compromise, and declare that if they are not granted what they ask they will sue, get a judgment and keep it open until such time as the Reading company shall be good for the amount. Under the provisions of the new constitution, if the Reading railroad property be sold it cannot operate its coal lands. To avoid a sale, and thus, perhaps, disintegrate the property, it is proposed to place the lands in the hands of a trust. This trust would be composed of gentlemen who are possessed of large means and are practical miners, and who would pledge the tonnage of the mines to the Reading railroad company. It was also stated that the Manor investment company, which has recently increased its capital stock from \$100,000, to \$1,000,000, and which is largely composed of gentlemen interested in the Pennsylvania railroad company, has for its ultimate purpose the absorption of the Pennsylvania railroad company's anthracite properties.

If you go to New York you will find the GRAND UNION HOTEL, opposite the Grand Central depot, a good place to stop. You can get an excellent room for \$1.00 a day. The restaurant is first class and moderate in price. The fact that it is always full is the best argument in its favor.

Lehigh Valley Coal Tonnage.

The following tables give the shipments of coal over the Lehigh Valley railroad and its branches, as reported from the forwarding office at Packerton, Pa., for the week ending Dec. 11, 1886:

Anthracite Coal Received and Forwarded

From PENNA. & N. Y. R. R.,	WEEK.	TOTAL
AND	Tons, Cwt.	Tons, Cwt.
WYOMING REGION.		

Sullivan and Erie Collieries	1,641 10	2,259 01
Pleasant Valley do	1,363 00	2,019 15
West Pittston Branch do	38,961 05	57,762 15
Del. & Hud. Canal Co.		
All other Collieries.		
Lehigh Canal, Mauch Chunk		
Total	41,065 15	62,041 14
Same time last year	39,473 19	70,362 05
Increase	1,591 16	
Decrease		8,320 11

HAZLETON REGION		
For Rail	53,303 14	89,728 01
do do to S & W R R.	1,370 09	2,205 05
Lehigh Canal, Mauch Chunk	124 08	124 08
Total	54,798 11	92,057 14
Same time last year	58,546 07	116,918 02
Increase		
Decrease	3,747 16	74,890 08

UPPER LEHIGH REGION		
For Rail		
Same time last year		
Increase		
Decrease		

BEAVER MEADOW REGION		
For Rail	18,461 01	30,497 14
do do to S & W R R.	103 09	178 12
do Lehigh Canal, Mauch Chunk		
Total	18,564 10	30,676 06
Same time last year	17,045 14	32,690 06
Increase	918 16	
Decrease		2,014 00

MAHANOY REGION		
For Rail	29,298 14	48,803 01
do Lehigh Canal, Mauch Chunk		
Total	29,298 14	48,803 01
Same time last year	31,387 02	66,708 07
Increase		
Decrease	2,088 08	17,905 06

MAUCH CHUNK REGION		
For Rail		
Same time last year		
Increase		
Decrease		

TOTAL ANTHRACITE RECEIVED

From Wyoming Region	41,065 15	62,041 14
do Hazleton do	54,798 11	92,057 14
do Upper Lehigh do	17,053 02	28,709 00
do Beaver Mead. do	18,564 10	30,676 06
do Mahanoy do	29,298 14	48,803 01
do Mauch Chunk do		
Total	143,727 10	233,578 15
Same time last year	118,051 11	230,923 07
Increase	25,676 00	
Decrease	3,325 12	53,100 05

Forwarded East by Rail from

Mauch Chunk	119,382 04	192,404 16
Same time last year	115,851 11	230,923 07
Increase	730 11	
Decrease		38,518 11

Distributed as Follows:

To P & N Y R R.	13,289 14	31,938 17
To L & B R R. at Lackawanna Junction		
To Del. & Hud. Canal Co., Wilkes-Barre		
To Penna. R R, South Wilkes-Barre		
To S & W R R.	1,173 18	2,383 12
To Northern Central R R.	324 18	324 18
To Individuals above Mauch Chunk	1,091 18	1,387 08
To Individuals at Mauch Chunk	177 06	320 04
To Lehigh Canal Mauch Chunk	124 08	124 08
To L & S Div. C. & D. at Packerton for rail		
To at and above Mauch Chunk for use L. V. R. R.	2,863 01	4,694 07
Forwarded East use L. V. R. R.	3,648 01	5,815 10
Local East of Mauch Chunk	2,610 00	3,990 12
Delivered to Furnaces and Mfg. Companies	17,636 18	28,176 04
Del. Sch. & Lehigh R R.	5 14	5 14
Ironton R R.	194 11	194 11
" Cal. & W. R. R.	116 04	106 09
" East Penn. R R.	11 10	43 10
" Perkiomen R R.	1,643 13	6,932 00
No R R.	3,225 14	4,865 17
" M & E Div. D. L. & W R R	1,361 05	2,023 01
" Central R R.	89 13	151 07
" Penn. R R. B. & O.	38,015 00	60,029 07
" New Jersey Division	47,148 16	71,046 04
" Port Del.	645 07	8,964 14
Total	143,727 10	233,578 15

Bituminous Coal Received.

From P & N Y R R.		60 01
do all other sources	853 17	1,030 18
Total	853 17	1,090 19
Total Anthracite	143,727 10	233,578 16
do Bituminous	853 17	1,090 19
Grand Total	144,581 07	234,669 14

COAL DELIVERED TO AND RECEIVED FROM P AND N Y R R.

Delivered to them.		
From Wyoming Region	17,544 15	30,815 14
do Hazleton do	579 00	821 13
do Beaver Meadow Region	165 10	301 10
do Mahanoy do		
Total	18,289 14	31,938 17
Received from them.		
From Sullivan and Erie Region	1,641 10	2,259 04
do Pleasant Valley	1,363 00	2,019 15
do West Pittston Branch		
Total	3,004 10	4,278 19
Total Anthracite Coal	21,294 04	36,217 16
do Bituminous do		60 01
Total delivered and received	21,294 04	36,277 17

There is a demand for coal in every direction.

COAL SCREENINGS.

The Mercer, Pa., coal business was never so brisk as it is at present.

Most of the mines on the Monongahela river are running but labor is reported scarce.

Altoona capitalists are buying large tracts of undeveloped coal lands in Westmoreland county, Pa.

Snowden and Hogg, the Brownsville, Pa., coal operators, have adopted the two weeks pay system.

The Salt Lake Tribune says the finding of coking coal in Colorado has practically stopped the smelting of ores in Omaha.

Large deposits of coal, said to be of very superior quality, have just been discovered on the island of Chiloe, belonging to Chile.

The Lehigh Valley company is reaching out in the matter of its coal trade, and will have an immense tonnage open to it in a few years.

It is claimed at Harrisburg, Pa., that railway employees get their coal at less than the retailer can afford to pay the carrying company for the same coal.

Telegraphic advices announce the discovery of coal in Henderson and Smith counties, Texas. In the former county, coal was struck at a depth of 30 feet.

All around Burlington, Iowa, shafts are being sunk for coal and borings made in search of natural gas and petroleum, and in many instances with marked success.

The coal discovery last season on Queen Charlotte islands by Robertson and Shields is said to be the best yet found on the Pacific coast. A seam 18 feet thick has been developed sufficiently to convince the owners that it is practically inexhaustible.

The official report of the Tennessee coal, iron, and railroad company for November show that there were received directly from the mines 10,979 tons of coal, and 11,904 tons of coke for the month, and 119,145 tons of coal and 124,635 tons of coke from January 1st.

ENGLISH MINING NEWS.

From the English "Labor Tribune," Nov. 27.

A workmen's reading-room has been opened at Trimdon colliery.

The coal trade shows a little improvement and though short time at some of the pits will be known, yet some of the best steam coal collieries have full work.

The miners of Denaby Main colliery have contributed £25 15s. towards a fund for the widows and bereaved families of the men killed by the Altofts explosion.

Coal has, during the year 1885, contributed £141,083 towards the established church, this being the amount which the ecclesiastical commissioners have encashed for royalties, &c., on coal in Durham.

M. W. Wilson, manager of the West Stanley colliery, has been fined £29 and costs by the Lancaster magistrates for leaving left without an attendant for six hours the engine at a shaft in which men were at work. The result was that a brakeman, not knowing of the presence of the workmen, set down the cage, and a shaftsman, named Robert Stoves, was killed.

Thos. Burt, M. P., speaking at a mass meeting of miners at Irvine, said the low wages and long hours at present existing in Scotland was due to the want of union among the miners. He strongly advocated union as the best means of improving their condition, and recommended them to return members to Parliament who would support measures for the protection of life and limb in mines.

A Burning Mine.

The fire at Meadow Brook colliery, near Scranton, Pa., is still burning and much more trouble is experienced in trying to extinguish it than was at first anticipated. The fire is situated about forty feet from a nest of boilers used to generate steam for the slope engine. It was probably smoldering for about six months before its discovery. It covers an area of one hundred feet square and the fire has worked its way through the roof rock probably forty feet above the seam. During the past fortnight two streams of water from large hose has been steadily directed upon it. So far there has been no perceptible effect. Hopes are still entertained that the fire will be extinguished with water, and the streams will be kept up for a few days longer. If, then, the fire has not perceptibly decreased, a new method will be tried; the fire will be walled in so as to be rendered air tight and a number of jets of steam from the boilers will be introduced. This method has proved successful in other cases after every other known expedient had failed. There is no evidence of the fire at the surface, at this point the coal is about one hundred and forty feet from the surface. The fire does not interfere with the ventilation of the mine, and none are discommodated with the gases except those who are fighting the fire. The pumps, instead of being used to keep the mine clear of water, are now directing the stream upon the flames. This causes the water to accumulate in low places in the mine and in consequence about forty chambers have been temporarily abandoned. Most of the workmen however, have been placed in other portions of the mine and the output is about up to the average.

Tris check swindler is getting in his work among the city retail coal dealers.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents should not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

Outstroke.

Editor Mining Herald and Colliery Engineer:

SIR:—Kindly permit me to inform your correspondent "W. F. B." that outstroke is the privilege of breaking the barrier and working and conveying underground the coal from an adjoining royalty. If a lease provides for making outstrokes it will all depend upon the wording of the clauses whether or not it be necessary to obtain the consent of the lessors to make them.

Yours, &c.,

T. B.

Pottsville, Pa., Dec. 4, '86.

Engineering Question.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you permit me to correct an error which I inadvertently committed in my reply to "Lithofractor's" safety value question in your last issue, which, though not greatly changing the result there obtained, should not go uncorrected. The formula for the weight should be as follows, instead of that given:— $W = \frac{A \cdot P \cdot d}{(t + w \cdot d)}$ from which we obtain the weight to be 161.29 lb.

Yours truly,

LYONS

Arnot, Pa., Dec. 4, '85.

Arithmetical Questions, &c.

Editor Mining Herald and Colliery Engineer:

SIR:—Will any reader kindly oblige by working out the following?

2. If one man could fill a tub in three minutes, another man did the same in four minutes, and a third in five minutes, how long would they be in filling the tub jointly and what proportion of the work would each man do?

3. How do I proceed to find the cost per ton of a colliery, say for six months?

4. What is the variation of the magnetic needle at present at Newcastle and Durham?

5. Which is the most improved method of connecting the underground with the surface survey?

6. What should be the dimensions of a Guibal fan to circulate 200,000 cubic feet per minute? A circuit of airway 56 ft. area, circuit of the mine 2 miles, diameter of shafts 14 ft.

Yours, &c.,

VALENTINE.

Pittston, Pa., Dec. 9, '86.

Latitude and Longitude.

Editor Mining Herald and Colliery Engineer:

SIR:—I shall feel obliged if any of your readers will inform me how to find the latitude and longitude of any place, and what instruments are required.

Yours, &c.,

ANXIOUS.

Houtzdale, Pa., Dec. 9, '86.

Deepest Shafts.

Editor Mining Herald and Colliery Engineer:

SIR:—A "Miner" will find the tabulated answer to his enquiry in Alan Bagot's work on *Mining Accidents*; page 117, giving depths and sites throughout the world.

Yours, &c.,

E.

Pittston, Pa., Dec. 11, '86.

Water Gauge.

Editor Mining Herald and Colliery Engineer:

SIR:—Could any of your readers inform me how the water gauge is constructed? I know a pipe from one end leading into the return receives the pressure of the return air, but how does the other end receive the pressure of the intake air? By inserting this in your paper you will oblige,

Yours, &c.,

ENQUIRER.

Shamokin, Pa., Dec. 5, '86.

Deepest Shafts.

Editor Mining Herald and Colliery Engineer:

SIR:—In reply to "A Miner," Ashton Moss, Lancashire, 900 yards; Rosebridge, Lancashire, 815

yards; Cemberton, Lancashire, 640 yards; Dukinfield, Peshire, 686 yards; Pandleton, Manchester, 536 yards; Harris's Navigation, S. Wales, 759 yards; Dolcoath, Cornwall, 720 yards; Stredly, Nottinghamshire, 586 yards; Hamstead, South Staffordshire, 650 yards; Shireoaks, Nottinghamshire, 510 yards; Monkwearmouth, Durham, 574 yards; New Sharlston, West Riding, Yorkshire, 510 yards; Hoyland Silkstone, West Riding, Yorkshire, 510 yards; Easton, Bristol, 360 yards; Nithail, Scotland, 350 yards; Blantyre, Scotland, 310 yards. Near Charleroi, Belgium, St. Andre shaft at the Poirier colliery, 908 yards deep and coal raised about 200 tons per day. There is another deep shaft near Charleroi the Sacre Madame colliery, 833 yards deep. The Simon Lambert shaft in Belgium is 1,163 yards deep, but this only an exploration shaft and not worked and is nearly filled with water. Prussia, St. Andre Silver Samson shaft, 844 yards deep; Saxony, Zwickau shaft, 879 yards; Austria, Przibram silver lead mine, Adalbert, 1,093 yards.

There are a large number of shafts in different parts of the kingdom much deeper than some I have named, but those mentioned are the deepest in the districts in which they are situated.

The longest airway which is recorded is that at the Bradford colliery, Manchester, which extends upwards of eight miles. The Hutton seam of the Monkwearmouth colliery is 5 miles and 528 yards in length, while at Blantyre their longest is only 1 mile and 1,136 yards. I trust that "A Miner" will find the above facts satisfactory to him.

In answer to a "Deputy," colliery plans are made on a scale of 2 chains to an inch.

Yours truly,

Birmingham, Ala., Dec. 6, 1886.

Mueseler or British Shaft Lamp.

Editor Mining Herald and Colliery Engineer:

SIR:—Kindly allow me to repeat the questions I asked in a late issue, viz.:—(1.) What should be the height of the pipe or chimney? (2.) The diameter of pipe at top and bottom. (3.) How far above top of wick pipe ought the bottom of the chimney to be? Will some inspector or other "authority" kindly answer?

Yours, &c.,

DENBIGH.

Shenandoah, Pa., Dec. 12, 1886.

Air and Pressure.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you be so kind as to insert the following replies to "Student's"?

1. 116.640 cubic feet ÷ 7.5 × 60 = 259.2 area;

259.2 ÷ 7854 = $\sqrt{330.0229}$ = 18.16 ft. diameter.

2. The last mentioned rule is generally used.

3. Let T = thickness of metal, H = head of water, D = diameter of pipes in inches; then,

$$\frac{H \times D \times .75}{9,000} = T.$$

Yours, &c.,

J. S.

Shamokin, Pa., Dec. 4, '86.

Editor Mining Herald and Colliery Engineer:

SIR:—I beg to submit answers to questions asked by "Student" in a late issue:

1. Size of shaft for 116,640 cubic feet per minute at a velocity of 7½ ft. per second.

$$\frac{116640}{7.5 \times 60} = 259.2 \text{ ft.}$$

equal area of shaft. And

$$\sqrt{\frac{259.2}{7854}} = 18.16 \text{ ft.}$$

equal diameter of shaft.

2. Rule to find pressure of water in pipes. Head of water in feet × 62.5 = pressure in lb. per square foot.

Head of water in feet × $\frac{62.5}{144}$ = pressure in pound per square inch.

Head of water in feet × $\frac{62.5}{2240}$ = pressure in tons per square foot.

Head of water in feet × $\frac{62.5}{2240 \times 144}$ = pressure in tons per square inch.

Yours respectfully,

VALENTINE.

Hazleton, Pa., Dec. 7, '86.

Editor Mining Herald and Colliery Engineer,

The following answers to "Student's" questions will, I think, be found correct:

1. Size of shaft, 18 ft. 2 in. diameter full.

2. Head of water in feet ÷ 62.5 ÷ 144 = pressure in pounds per square inch.

3. Head of water in feet × diameter of pipe in inches × $\frac{1}{3}$ ÷ 9,000 = thickness of metal in inches.

4. The advantages of compressed air underground are obvious; there is no condensation in the pipes, as with steam, and the air travels quicker in the pipes than steam; you have more pressure at pit bottom than at top; underground steam boilers and their attendant dangers are avoided, and air can be

conveyed to engines any distance underground without troubling as to what you are to do with your exhaust steam.

Yours, &c.,

W. W. M.

Chillicothe, Ohio, Dec. 9, '86.

Arithmetical Answers.

Editor Mining Herald and Colliery Engineer:

SIR:—Arithmetical questions asked by Geo. W. Walker in a late issue. Solution by logarithms being required in detail.

1. "What is the 2.19 power of $7\frac{1}{2}$?"

2. "What is the 2.19 root of '25364'?"

Here 1, $7\frac{1}{2}$ = '4375, and ('4375)^{2.19} =

Log. of '4375 = 1.640978

2.19

1.403742

2.19

Log. of '163584 = 1.213742

∴ ('4375)^{2.19} = '163584.

Here 2, ('23364)^{1.17} = log. of '23364 = 1.452767

1.17

∴ ('23364)^{1.17} = '460642.

Trusting that these particulars will suffice.

Mining and other questions asked by "Student" in the same issue, viz.:

1. "Quantity of air 116,640 cubic feet per minute entering a mine, mean velocity of current in the shaft 7½ ft. per second; required the diameter of the shaft?"

2. "Give the correct rule for finding the pressure of water in pipes?"

3. "Give the rule for calculating the thickness of pipes necessary for heads of water equal to 300 ft. and 500 yards?"

4. "Enumerate the advantages claimed for the application of compressed air to engine placed underground."

1. Here 7½ ft. per second = 450 ft. per minute, and 116,640 ÷ 450 = 259.2 square feet area of shaft, ∴

$$\left[\frac{259.2}{7854} \right]^{\frac{1}{2}} = \sqrt{330.0229} = 18.166532 \text{ ft.,}$$

diameter of shaft.

2. The three rules quoted by "Student" are based upon the weight of a cubic foot of water being 1,000 oz. or 62.5 lb., hence,

$$\frac{62.5 \text{ lb.}}{144 \text{ sq. in.}} = '434028 \text{ lb.}$$

equal 12 cubic inches = a column of water 1 ft. in

height, having a base of one square inch area, ∴

head of water in feet × '434028 lb. = pressure in lbs. per square inch, and 1 cubic inch of water = '036169

lb. = a column of water 1 inch in height having a

base of one square inch area, ∴ head of water in in. ×

by '036169 lb. = pressure in lbs. per square inch.

These are the correct multiples, and agree in each case, but in practice they are curtailed to '434 and '03617, or '000028 lb. too little in the first case, and '000012 lb. too much in the latter case, for a head of

water 1 ft. in height, and for a head of water in 1,000

ft. it would be '028 lb. too little in the first case and '012 lb. too much in the latter case, thus giving the

preference to the smaller standard, but inasmuch as the difference is so trivial, the simpler method of calculation would be in favor of a multiple '434, or

higher standard.

3. As it has been found by experiment that a cast iron pipe 15 in. diameter $\frac{1}{4}$ in. thick will be sufficient

ly strong for a head of 600 ft., the following rule is

given to ascertain the thickness of metal in a pipe

when its diameter and the head of the water are

given.

Head of water in feet × diameter of pipe in in. × $\frac{1}{9,000}$

= thickness of metal in inches, ∴ for a head of water of 300 ft., and for a pipe of 15 in. diameter, we have

$$\frac{300 \times 15 \times .75}{9,000} = .375 \text{ in.}$$

as the thickness of the metal. Inasmuch as the rule is evidently limited to heads of water not exceeding

600 ft., and to determine the thickness of the metal in pipes 15 in. diameter, having a head of

water of 2,400 ft., the thickness of the metal should

be '75 × 4 = 3 in. Taking this as a basis for heads of

water not exceeding 2,400 ft., we have as a formula:

Head of water in feet × diameter of pipes in in. × 3

36,000

= thickness of metal in inches, or thus,

$$\frac{2,400 \times 15 \times 3}{36,000} = 3 \text{ in.,}$$

thickness of metal; and by reducing the constants 3 and 36,000 to their lowest terms, this formula may be

applied thus:

Head of water in feet × diameter of pipe in in. × 1

12,000

= thickness of metal in inches, as the simpler equation. Hence, this formula embraces all heads of

water up to 2,400 ft., and is simpler for use than the

first formula given for heads of water not exceeding

600 ft. When the limit of thickness of metal

has been reached further calculation on a reduced

scale is unnecessary.

4. (1.) It increases the ventilation of the mine, to the advantage of the workmen and horses employed. (2.) It lowers the temperature of the mine, to the advantage of preserving the timber in the roadways; hence, a saving is effected in less renewals being required. (3.) It removes the danger that might otherwise arise from ignition of the coal and gases of the mine, from spontaneous combustion from boiler fires and exhaust steam drifts. But, on the other hand, its great want of economy as a motive power prohibits it from superseding steam power as applied in a direct form; hence, its extension will be greatly limited on that account. But as an air locomotive, when the mines are not over steep, it will no doubt supersede the use of horses working between the engine-plane terminus and the face of the workings, and possibly, in very flat mines, be employed as a locomotive, worked by compressed air, from the transit of tubs and coals, between the shaft and the face of the workings, when the boundaries are of moderate extent. These particulars, I think, will meet "Students'" requirements.

Yours, &c.,

R. A. M.

Philadelphia, Pa., Dec. 8, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer:

The following is an answer to the "Young Colliery managers'" question on ventilation, issued on the 20th ultimo, the question read something like this:

A few years ago I had under my charge 50 miners, each got 250 cubic ft. per minute, this quantity passed along an airway 5'x5' area, &c., 2,000' long, since then the aircourse has increased 6,000' further. I at present have 90 men and only 6,250 cubic ft. per minute passing, and desiring to bring my ventilation up again to 250 cubic ft. per minute per man, what must be the area of the airway to pass this quantity (22,500) with the same power?

As will be observed, the units of work employed when the miners were getting 250 cubic ft. per minute equalled 108,500. If the same power were used to-day there would be 7,800 cubic ft. per minute passing, and as the pressure is the same today as formerly, &c., the quantity passing only half, therefore, the units of work today equal

$$108,500 \div 2 = 54,250.$$

Formula to find a square airway:

$$5 \sqrt{\frac{4 K U Q^2}{U}}$$

$$\text{or } 5 \sqrt{\frac{4 \times .000000217 \times 8000' \times 22500^2}{54250}} =$$

$$116' \text{ area. } .0000000217 \times (\sqrt{116} = 10.77 \times 4 = 43' \times 8000').$$

$$344,000 = .007468 \times (22500 \div 116 = 193.9')^2 7290295 = 54,421.$$

If these figures were more accurately carried out, this would come out O. K.

Yours Respectfully,

SMALL CALIBRE.

Peoria, Ills., Dec. 5, '86.

Dimensions Wanted.

Editor Mining Herald and Colliery Engineer:

SR:—Will any of your readers give a rule for the following or show a student how to work it out? A shaft has an area of 192 square feet. The length is three times the width. What is the length and width of shaft?

Yours, &c.,

A MINER.

Neshannock, Pa., Dec. 9, '86.

The Mine Prop Law.

Ever since the new mine ventilation law was passed there have been portions of it the coal operators of the Hazleton region refused obey the timber clause especially, because, as they claimed, it was unconstitutional. Among the companies who objected and would not furnish prepared timber to the miner, as required by law, were A. Pardee & Co., the Black Ridge improvement company, and G. W. Markle & Co., operating the Jeddo collieries. There are a great many indications now that the law will be in full operation before long. On the 2nd inst., a committee of Cranberry local assembly, Knights of Labor, headed by Master Workman Quinnan, waited on A. Pardee of the firm of Pardee & Co., and requested to have the miners furnished with prepared props. Mr. Pardee replied that the law was unconstitutional. The committee answered that they did not meet him to discuss the constitutionality but to request its enforcement. The old gentleman kindly consented and the committee departed in an exultant mood.

A strike of miners employed at the Bear Valley shaft, in the Shamokin region owned and operated by the Philadelphia and Reading C. & I. company, was inaugurated Saturday in consequence of a reduction of 10 per cent in the wages of miners working certain seams. The local assembly, Knights of Labor, ordered the miners to continue work, pending arbitration. But the men refused to obey the order. As a result of the strike 600 men and boys are idle.

IMPORTANT.

When you visit or leave New York City save Baggage, Expressage and \$3 Cabbage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot.

613 Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best. Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city. 23-ly

Missing Papers.

We mail and send our papers to subscribers as carefully and regularly as possible, but changes occurring sometimes in our mailing hands, by illness or otherwise, or changes in the post office here or at place of delivery, may cause irregularity in the receipt of the paper by the subscriber. We therefore request that *always*, when subscribers fail to receive their paper in due time, that they notify the office by postal card or letter, and we will, if possible, re-mail all missing numbers.

BUSINESS POINTS.

Captain Henry Hesser, of Schuylkill Haven, Pa., general coal-car dispatcher of the Reading railroad company, was discharged Thursday after forty-two years service.

The railroad coke pool report for the eleven months ending Nov. 30, shows the most wonderful increase known in the history of the coke trade. It is estimated that the increase for the full year, notwithstanding the fact that there was a strike which lasted six weeks and that during the remainder of the time the coke pool has not been able to handle the output.

In the ejectment case of Isaac X. Grier, of Danville, and Mary O. Davis, of Easton, against the Pennsylvania coal company, on trial in the Scranton, Pa., court last week, the jury rendered a verdict for the defendants. The case involved 190 acres in coal land on Moosic mountain. The property is worth \$50,000.

Some soft coal operators and shippers are of the opinion that, should the bituminous coal mining interest agree upon all their details and conclude finally upon the formation of a soft coal pool, the transportation companies will then likely refuse to be bound by any limit of tonnage which may be agreed upon.

It is estimated that the entire stock of coal with companies at the beginning of December was not over 500,000 tons nearly one-half of which was stove coal, and that under a smaller output this month, as compared with last year, the companies will have 750,000 tons less coal to take care of, and if the weather continues seasonable a much better demand than last year.

A Comparison of Wages.

Among the public documents which congressmen are scattering with a frank hand is "Consular Reports of Labor in Foreign Countries." It is to be regretted that every Knight of Labor could not have a copy. Many a long winter evening could be spent profitably in the perusal of this exceedingly valuable publication. Each of its three volumes contains a storehouse of industrial information, showing with especial fullness the wages paid different workmen in different localities. Each "section" or guild should certainly have a copy. We give below a table gleaned from an elaborate series of tables, the wages given being weekly:

	England and Wales.	Germany.	Austria.	New York.	Chicago.
Bricklayers.....	\$7.56	\$4.21	\$3.55	\$20.00	\$24.00
Hod-carriers.....	4.94	2.29	2.08	11.00	10.50
Masons.....	7.68	4.07	3.73	18.00	24.00
Carpenters.....	7.68	4.11	5.10	14.00	16.50
Brickmakers.....	7.00	7.00	6.20	10.00	17.40
Butchers.....	5.50	3.32	5.50	8.00	16.50
Cigarmakers.....	6.07	3.63	3.00	11.15	18.00
Coopers.....	7.50	3.97	3.64	12.00	12.00
Street railways.....	6.09	3.14	3.38	11.00	13.50
Printers.....	7.17	4.85	4.85	13.00	18.00
Laborers.....	5.70	3.11	3.00	9.00	10.50

It will be seen that English rates are much higher than German, but beggarly as compared with New York, which is not up to the Chicago average. The Chicago bricklayers are paid more than three times as much as the London bricklayers, masons three times as much, butchers three times, and, in fine, all along the line the advancement is prodigious. The difference in mode of living is as great as that in wages, the humblest Chicago laborer being able to indulge daily in luxuries which the European workmen enjoy only on holidays. The American wage-worker has only to couple sobriety with common sense to find life richly laden with the legitimate fruits of industry.

The outcome of the meetings of the representatives of the several bituminous coal mining districts east of the Alleghenies, held for the purpose of endeavoring to form a pool in that class of fuel, is awaited with much interest by the anthracite operators. They have already felt the stimulating effects of the advance in the asking price for bituminous coal in the stiffening of the prices for the steam sizes of anthracite.

Indications point to a general strike of coal miners in the Mahoning valley, Ohio. The men demand ten cents per ton, which the operators say they cannot afford to pay.

Manual Training Schools.

In his now completed annual report Labor Commissioner Peck (N. Y.) attributes the lack of skilled American workmen to the absence or non-enforcement of good apprenticeship laws and to the scarcity of manual training schools. It is stated that the foremen and skilled workmen in our machine shops and manufactories are, to a great extent, foreigners, and that these people are continually pouring into the country. It is argued that this would not be so were the apprentice law enforced. Under the law the masters of the poor in the various countries are responsible for all boys put out as apprentices. Mr. Peck, in his opinion he held, that these men knew nothing even of the existence of such a law, caused inquiries to be sent to them asking for information concerning the number of apprentices in their charge and pointing out the statute under which they are supposed to act. They all replied that they did not know there was such a law in existence. Mr. Peck says that this law is now impracticable, and believes that manual training in the public schools will prove the solution of the apprenticeship problem. Consequently his report will contain a history of manual training from its first introduction in the schools of Russia to the present time. One reason why foreign mechanics are such skilled workmen is because the foundation of their knowledge was laid in these industrial schools. With this report will be given tables showing the slight cost of opening and operating these schools in connection with the public school system. Reference will also be made in the complete work shop for their education now in successful use at Girard college, in Philadelphia. The argument advanced is that not only do such schools inculcate a general knowledge of and love for handling tools, but impart a dignity to manual labor by familiarizing the children of both the poor and the rich with the work of the bench and in the clothing of the artisan.

About Burning Coal.

The grading for the new coal shed here is nearly completed and several new side tracks are being put in. The building will be 350 feet long and 60 feet wide, and will be capable of containing 400 tons of coal. There will be four side tracks in the building, and engines will be loaded by a derrick and donkey engine fixed up on a small flat car. All of the engines running through to Sacramento have been changed from wood to coal burners, but those running to Rocklin, some 15 in number, will not be changed, but will continue to burn wood. The supposition prevails that the railroad company finds it cheaper to burn coal than wood, but a prominent railroad man informs us that such is not the fact. While the first cost of wood is a little more than coal, yet when the effect of coal upon machinery is taken into consideration, it is said that wood is the cheaper. With the use of coal, the fire-boxes and flues of locomotives soon burn out and have to be replaced every few years, and the gritty cinders adhering to the working parts of the machinery cause them to wear rapidly. In wood burners the fire-boxes seldom have to be replaced, and there are several engines in the division that still contain the same boxes which were put in at the time of their construction, nearly 20 years ago. Therefore, wood is considered the cheaper fuel. Other motives than those of economy seem to have moved the railroad company to make the change they have. We hope that the change will not be a permanent one, as a serious blow would be dealt to one of the important industries of the vicinity.—*Truckee Republican*.

"Before many months the miners' and laborers' amalgamated association will be swallowed up by the Knights of Labor," said one prominent in the council chambers of both organizations. And so it looks. State President George Harris, of the first named organization, with his coadjutors, John H. Davis, of Mt. Carmel, and T. T. O'Malley, of Illinois, have been working hard for a fortnight to prevent it, but the small audiences that have gathered to hear them in Northumberland and Schuylkill counties prove that they are unable to stop the desertion. The intense feeling between the rival organizations was shown this week. A prominent labor paper applied the terms "intruders" and "life-sappers" to the Knights of Labor. In the present condition of affairs both organizations are without influence, and the operators are little disposed to meet the demands made by their employees. President Harris has set on foot a scheme to organize the boys into branches into the M. & L. A. A., but the wisdom of the move is doubted by old and wise heads.

COKE is the solid carbon and ash of coal, and is produced by driving off the volatilizable constituents, as water, hydrogen, sulphur, &c. Under pressure, with a slow fire at beginning and until the sulphur is driven off, followed by a brisk fire, the product will be a hard, heavy, bright coke, that has a ring when struck, while a smouldering fire, without pressure, yields a dark, spongy product.

"ALL the forests of the Mississippi Valley could not furnish to the sea from their river spoils, during a hundred thousand years, one of the anthracite beds of Schuylkill county, Pennsylvania."—*Lestie*. It would be interesting to know, then, what will be the prevailing fuel used a few thousand years hence, when our present coal beds and gas wells have become exhausted. Shall it be electricity?—*Indianapolis Coal Mirror*.

TRADE REVIEW.

THE COAL TRADE.

The late spell of cold weather had a double action on the trade in anthracite. It quickened demand for the household sizes of the mineral, while it curtailed production and shipments from the mines. These circumstances have so contributed to the already favorable condition of the trade, that all interests now look with confidence to the opening of the new year, which will be entered on with depleted stocks and a healthy scale of prices, two features which have been sadly missing in past cycles. The approach of the holidays, when running will by old established custom close down for a week, inspiring up consumers to place their orders as quickly as possible lest they be caught in the lurch on short stocks. This keeps the line and city trade in a most active condition and leaves the retail dealers no excuse for cutting rates, which are per consequence well maintained. The bears have tried to convey an idea to the outside public that demoralization in prices was coming, but retailers and householders are able to put two and two together, and perceive that with no surplus stocks on hand and a firm adherence to the restrictive policy on production there is no occasion for cutting rates anywhere. All reports from the various quarters of anthracite trade are of firmness in prices, and slackness of supply, especially at interior points. The close of navigation is drawing heavily on the railroads, for transportation facilities, and were it not that the falling off in freight business from agricultural sources comes at the same juncture they would be wholly unequal to the emergency. All the carrying companies are looking forward to next year's trade by the placing of contracts for additional rolling stock.

At the meeting of the coal managers in New York on Tuesday it was decided to advance chestnut coal fifteen cents a ton. Prices for other sizes remain unchanged. The meeting was very fully attended, and all the interests being represented, and was entirely harmonious.

Two stories, having an important bearing on the trade, have been exploded the past week. One of these was that relative to the leasing of P. & R. collieries, which President Corbin says is not in any way contemplated. The other was the reported purchase of the Borie coal property, on Broad Mountain, by the Pennsylvania company, which is said by those in position to know to have no foundation in fact. Much of the speculation made as to the value of this purchase was merely fanciful. Of all the efforts made in its development thus far none have warranted enthusiasm in the matter of its ownership. It may be rich in mineral, but that remains to be proved.

L. B. Paxson and a number of other prominent P. & R. officials, accompanied by Chief Engineer Whiting, were on a tour of inspection of the P. & R. C. & Cos. collieries in the Shenandoah region this week. The object was to ascertain if it is possible to operate the mines at less expense, and to note what unnecessary and ornamental adjuncts, if any, there are about the collieries. A number of changes in the mining departments are in contemplation, but no action will be taken until after a thorough inspection of the present system has been made. A system of mining and preparing the coal by contract is also under consideration, and may be adopted.

There has been no positive advance made this week in the formation of the bituminous coal pool. Meetings were held this week to try and arrange the difficulty connected with percentages of production, but nothing definite was arrived at. The allotments asked for aggregate 160 per cent., while there is lacking that spirit of concession that is necessary for an adjustment of the case. In the meantime, trade is firm and prices maintained. No contracts for next year have yet been reported as placed.

The total amount of anthracite coal sent to market for the week ending December 4, as reported by the several carrying companies, was 795,918 tons, compared with 765,429 tons in the corresponding week last year, an increase of 30,489 tons. Total amount of anthracite mined thus far in the year '86 is 30,162,741 tons, compared with 29,521,590 tons for the same period last year, an increase of 641,151 tons. The following statement gives the gross tonnage for each of the leading coal carrying companies for the week ending December 4, and for the

year to same date, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R. R.	188,230	188,230	209,783	D 21,553
Lehigh Valley	89,851	89,851	139,716	D 49,864
P. & R. and Western	101,984	4,737,216	4,687,908	I 69,308
Shamokin	19,861	7,81,257	966,247	D184,990
Ut. R. R. N. J.	41,005	1,607,279	1,653,015	D 45,736
Penn. Coal	31,294	1,391,505	1,335,568	I 55,936
Del and Hudson	95,039	3,851,595	3,671,736	I 179,859
Pa. and N. Y.	23,098	25,098	35,012	D 11,914
Clearfield P. R.	55,008	2,077,125	2,066,377	D50,748
Hun and B. Top.	10,664	609,005	588,937	I 20,068
Nor. and W. Va.		789,666	538,487	I 242,179

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Dec. 4 was 298,824 tons, of which 222,624 tons were coal and 76,200 tons coke. Of this weekly tonnage 229,132 tons originated on the main line of the Pennsylvania railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 13,986,131 tons, of which 10,699,544 tons were coal and 3,286,587 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending December 11, was 252,500 tons, of which 25,100 tons were sent to and 23,300 tons shipped from Port Richmond, and 27,000 tons were sent to and 26,500 tons shipped from Elizabethport. Vessels are reported in fair supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and 90c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at \$5@51 and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending Dec. 4 were 56,175 tons, and for the year to date 2,346,609 tons, a decrease of 274,650 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—week, 47,249 tons; year, 1,832,703 tons; decrease, 33,922 tons. To Pennsylvania railroad—week, 3,834 tons; year, 239,952 tons; decrease, 158,222 tons. To the Chesapeake and Ohio canal—Week, 5,092 tons; year, 233,954 tons; decrease, 82,506 tons.

Pittsburg.

From the American Manufacturer.

The rivers have fallen, until there is no longer sufficient water in the Ohio on which to send out coal. The late freshets were a boon, both to the operators and to the consumers in the lower markets, where coal had become exceedingly scarce and distressingly dear. Not only the Monongahela operators, but those of the Kanawha Valley also, made large shipments, there being at this writing only 2,000,000 bushels loaded at the mines along the Monongahela. Mining, however, is being prosecuted vigorously, there being perhaps 7000 miners at work, who can dig about 500,000 bushels a day. The mines of the Monongahela are capable of employing about 8,000 miners, but many of them drifted to other points during the long period of inactivity prior to the late freshets. The last freshet was not only sufficient for moving "barges" and "flats" but "boats" also, which latter are on their way to the far south. There is barely water enough in the Ohio to permit the return of empty craft, but at this writing the towboats are obliged to "lay up" for a short time on account of the floating ice. Warmer weather, however, is promised, and doubtless many, if not all, the empties will get into this port before navigation is closed by lower water or ice. All the returning empties are between here and Pomeroy, Ohio. At New Orleans, prices of first and second pool coal are 30c. per barrel, third pool 29c. and fourth pool 28c. At Cincinnati and Louisville prices are unchanged, the outside figures being for coal from the two lower pools.

We quote as follows:

PRICES AT PITTSBURGH.	
River, wholesale, on board	4 @ 5 cts. per bushel.
Railroad	4 1/2 @ 5 cts. per bushel
AT CINCINNATI.	
River, wholesale, on board	3 1/2 @ 4 1/2 cts. per bushel.
AT LOUISVILLE.	
River, wholesale, board	6 @ 7 cts. per bushel.
AT NEW ORLEANS.	
River, wholesale, on board	28 @ 30 cts. per bbl.

Bushels are rated among dealers here at 76 lb.—26 1/2 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4/7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

The demand for coke continues to be fully equal to the production. Cans are more plentiful than they were, but are still a little scarce to please the operators and the consumers, giving considerable extra trouble and causing not a little anxiety to the furnace owners. Prices will remain as follows through December: Blast furnace, \$1.50, f. o. b.

cars at the ovens; foundry, \$1.75; crushed, \$2.25. The supply of cars is good.

Chicago.

From the Industrial World.

While the movement of anthracite coal is improving somewhat in volume from week to week, shipments as yet are not at all adequate to the demand, and dealers are not in any kind of shape to take further orders. The bulk of the shipments are made over the roads other than the Pennsylvania Central, which latter, apparently, is as much in arrears with its shipments as at any time during the fall. Values are entirely without change, being firm at card rates for extended delivery, and at a premium of 25 cents for immediate shipment.

The long continued stringency in the anthracite market has stimulated an unusual demand for bituminous coal, and as eastern grades have been slow in movement, sales of western coals have been very heavy this season.

Coke is receiving considerable attention from furnacemen, foundrymen, and other consumers who are anxious to secure themselves against any possibility of their being cut off from the supply in case of further labor troubles in the Connellsville region. Shipments at present are not over-abundant.

We quote wholesale prices to consumers as follows, f. o. b. Chicago:

ANTHRACITE.	
Per gross ton by carload, 2240 lbs	
Grate	\$ 6 15
Egg	5 30
Stove	6 45
Nut	6 45
Lehigh Lump	8 40
No. 4	6 75
Per net ton by carload.	
Grate	\$5 50
Egg	5 30
Stove	6 75
No. 4	6 00
Nut	5 75
Lehigh Lump	7 50
BITUMINOUS.	
Erie & Blarhill	\$4 50
Pittsburg	3 25
Indiana Block	2 65
" Slack	1 25 @ 1 35
" Nut	1 56 @ 1 60
Baltimore & Ohio	3 25
Hocking Valley	3 50
Youghiogheny	3 25
Winnington	2 25
Blossburg	2 50
Cumberland Smithing	3 70
Sonman Smithing	3 80
Grape Creek	2 50
Fountain County	2 00
Clinton Lump	2 00
Sirator	2 00
Minonk	2 00
Morris	2 00
CANNEAL.	
Kanawha	5 00
Buckeye	4 35
COKE.	
Connellsville Coke	4 75 @ 5 00
Crushed Coke	4 75 @ 5 00
Charcoal, carload per bu	8 1/2 @ 9 1/2

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Dec. 11, 1886:

	Week.	Year.
	Tons.	Tons
Shipped North	40,520.06	2,267,994.12
Shipped South	67,193.13	2,582,235.40
Total	108,013.19	4,845,229.52
For corresponding time last year		
Shipped North	45,002.15	3,211,086.94
Shipped South	79,692.16	2,481,578.91
Total	124,695.11	4,792,665.85
Increase		52,625.07
Decrease	16,681.12	

Freight Rates.

The following are the current rates of freight on anthracite coal from Port Richmond, as officially reported Dec. 13, 1886:

To	Rate	To	Rate
Bangor	.....	Fall River	.....
Gardiner	.....	Providence	.....
Portland	.....	New York	.....
Saco	.....	Baltimore	58 & alg.
Portsmouth	.....	Washington	80c.
Newburyport	.....	Norfolk	60c.
Lynd	.....	Richmond	75c.
Boston	1.05 & 1.25	Charleston	85c.
New Bedford	1.00 & 1.25	Savannah	90c.

Pennsylvania Coal Company Shipments.

Following is the report of shipments of Pittsburg coal for the week ending Dec. 11, 1886:

Shipped East to tide	6,315-03
" Local points E. M. & Erie	4,498-02
" West via L. S. & Erie	5,042-15
Total	15,855-00

The supreme court of the United States decided in a recent case that the directors of a railway company are not bound to divide all the annual profits of the company among the stockholders. They may make other use of part of the earnings if they think it best to do so. According to this there will not be much encouragement to go on with legal proceedings threatened to compel the Pennsylvania railway company to divide the surplus, as demanded by the English stockholders.

ON SAFETY LAMPS.

WHAT IS REQUIRED OF THEM AND WHERE THEY HAVE FAILED.

Tests of Various Manufactures Made by the English Commissioners on Mines—Conclusions Arrived At.

From "Transactions of the Mining Institute of Scotland."

(Continued from Page 427.)

The commissioners say the Scotch lamp can scarcely be regarded as a safety lamp at all. The one submitted to experiment was from Blantyre colliery, gauze 7" high and 2 9/16" diameter, with a cone 2 1/2" high and the gauze in it double through a height of 1 1/2" from the apex. Tested at Garswood in a current of 400 feet velocity, containing 6 1/2 per cent. of natural gas (= 5.46 per cent. marsh gas), it produced an explosion in 14 seconds. At Llynypia in a current of 600 feet velocity containing 6 1/2 per cent. of natural gas (= 2.65 per cent. marsh gas); after 75 seconds it was red hot where the flame impinged but not elsewhere, and the experiment was stopped, an explosion not being imminent. Tried at Woolwich in a current of 1000 feet per minute containing 8 per cent. of coal gas it produced an explosion after three seconds, the lamp at once filling with inflated gas.

In an explosive current of 400 feet velocity the ordinary Davy causes external explosions. The addition of a metal shield partly surrounding, or of a glass cylinder entirely surrounding the gauze (Jack Lamp) makes it safe in currents of from 600 to 800 feet per minute. When the glass of the Jack Lamp extends the whole height of the gauze (Davy in case) it resists currents having velocities of 1200 feet per minute. One of these only produced an explosion after being exposed for 47 seconds to a current of 3000 feet per minute. The Tin Can Davy (the lamp being enclosed in a tin can of its own height with a glass window) did not seem likely to give an explosion after having been exposed to a current of 3100 feet of velocity for two minutes.

The Stephenson lamp becomes untrustworthy in velocities of 800 feet, and at 1000 feet per min. it almost always caused explosions. At high velocities the feed passed down the lamp and gas ignited at the top where the gauze speedily became red hot. As with the Davy there are many modifications of the Stephenson which make it more secure. The safest of these seems to be Gray's lamp in which the air feeding the flame is brought down from the top by four tubes. It gives a fair light, is not liable to extinction by considerable oscillations, and it resisted a current of 3000 feet per min. for 100 seconds when the glass cracked.

The Clanny fails in a current of 600 feet velocity. When the gauze is protected by an external metal case it becomes a bonneted Clanny, which did not appear dangerous in currents of 1500 to 1900 feet per minute, but produced explosions at 2,857 feet velocity. When in addition to the bonnet the Clanny is provided with three gauzes close together at the bottom, but separated at the top, as proposed by Marsaut, the commissioners have not been able to produce an explosion with it, although it has been for two minutes in a current of 3,100 feet velocity and seemed to be able to hold out so long as the glass remained intact. It gives a good light. Another lamp of the same type is by Evan Thomas. The flame is bright and steady in strong currents, and it showed no signs of danger after being exposed to an explosive current of 3,200 feet velocity for 8 minutes.

Dealing with the Mueseler, the commissioners notice that its security is considerably affected by the modifications it has undergone in this country with the view of rendering it less liable to extinction; they also point out its unsafeness in oblique currents, from the reversal of the action of the lamp, and the burning of the gas at the top of the chimney. This is impossible in the bonneted Mueseler to which form of lamp Mr. Stokes has added an arrangement by which the outlet is closed, and burning gas extinguished half a minute afterwards. Morgan's lamp, also a bonneted Mueseler, the commissioners consider one of the safest submitted to them.

Such current velocities as 3000 feet per minute, which several lamps have withstood, can only occur in mines at restricted parts of main airways, and in exceptional cases be caused for a short time only, by a blown-out shot or a heavy fall; hence the commissioners conclude that lamps are now in existence which when properly used afford security under all circumstances likely to occur in mines.

The four in which the qualities of safety, simplicity, and good light are united are:

	weight	Light	Velocity Tested.	Duration of Experiment.
	Lbs	Candies.	Fl. per min.	
Gray's.....	2 3/4	0.3 to 0.4	3-100	1 min.
Marsaut.....	2 1/4	0.4 to 0.5	3-100	2 min.
Evan Thomas.....	3 1/2	0.4 to 0.5	3-200	7 min. 10 sec.
Bonneted Mueseler.....	2 3/4	0.3 to 0.4	2-850	

In the first three the flame is not readily extinguished but the fourth, like all Mueselers, requires careful handling. The ultimate source of danger with all these lamps is the breaking of the glass, and the commissioners suggest certain modifications for diminishing this risk, and see no difficulty in adding appliances for closing the outlets and inlets, and go on to consider arrangements that have been proposed for securing automatic "shut offs," when a certain temperature has been attained.

They consider it absolutely necessary that the safer and more complicated lamps should be regularly tested in an explosive mixture before being used.

Treating of illuminants, they comment very severely on the introduction of petroleum spirit, under the name of coalzale, without prescribing proper directions for the use of such a dangerous oil. Young's lamp, burning solid paraffin, yields a safe and good light, but the commissioners consider the fact that the paraffin requires to be melted around the wick before the lamp will burn, a formidable obstacle to its use.

They conclude from experiments which they have made that for safety lamps seal oil is superior to rapoil, and find that a mixture, containing one part of paraffin or petroleum (flashing point not less than 80° F.) and two parts of rapoil or seal oil is a much superior illuminating agent.

The following provisions, relating to lighting, were included in the "Coal Mines Regulation Bill, 1886":

In mines where safety lamps require to be used lamp stations for lighting or relighting shall not be placed in the returns. In any seam of a mine, where inflammable gas has been seen within the preceding three months, no lamp other than a locked safety lamp is to be used, and safety lamps only shall be employed in any working place or traveling road where derangement of the ventilation would probably be attended with danger by reason of an accumulation of inflammable gas; and the same rule applies to every working approaching a place where there is likely to be an accumulation of fire-damp.

Safety lamps are to be so constructed as to be safe in currents moving with a velocity of 800 feet per minute; and if Davy lamps are used, the protecting shield, but not the gauze, may be temporarily removed by a competent person, appointed in writing, in order to test for gas or to light shots.

The Home secretary was empowered to prohibit the use of any safety lamp not provided with a shut-off apparatus for the extinction of the lamp flame or that of the ignited gas, and he also took powers to secure that the locking apparatus should be approved by him, and could require that all lamps should be tested before use in an explosive mixture.

To any one who attentively follows the work of the commissioners there looms up a more or less distinct outline of the present position of the outposts of our mining battle—a battle in which we lose a thousand men a year. Mining is an art; an art consists in the application of knowledge to the purposes of life. This application constitutes engineering in its proper sense, but we cannot apply until we know. The commissioners have applied their scientific knowledge with indomitable pertinacity, for the purpose of reducing the risks attending shot firing; and it must be admitted that in this direction they have advanced our line. The methods of dealing with fire damp indicate a long advance from the time when quaint chroniclers tell us "a man more purposeful than the rest" descended the mine and burnt it out with a light at the end of a pole; but on the oversman, the man "more purposeful than the rest," the safety of our mines still in a considerable degree depends, and it is hoped that these notes may afford him useful information.

MINERAL CONCENTRATES.

In Sweden there are ten millions of silver to five of gold in circulation.

In the Netherlands the money in circulation is nearly all in silver coin.

A deposit of pure asphaltum, from fifteen to twenty feet thick, has been discovered near Thistle station, Utah.

The silver mills of Montana represent an investment of \$20,000,000, and her mining machinery as much more.

The amount of gold coin in the United States increased about \$14,000,000 between the beginning of '86 and July 1.

A private letter from Oklahoma, Indian territory, says that the excitement following the report of the discovery of gold in that country is increasing.

BEFORE THE INSPECTOR.

Questions and Answers Bearing on the Science of Engineering.

Inspector. "Has the condition of an engine anything to do with economy?"

Candidate. "Yes, sir; it has the very greatest influence upon it."

Insp. "Suppose your cylinder was very much worn, that is scored, and out of true generally, what would the result be?"

Can. "A vastly increased consumption of coal."

Insp. "Why would this follow?"

Can. "For many reasons—not the least of which is the actual leakage of steam through and past the piston without doing any useful work; a further cause of loss would be the enormous friction engendered in the cylinder by the effort to force the rings out into the grooves; an engine out of order causes an enormous waste of coal and power and would pay for its own repairs in a fortnight."

Insp. "How is the performance of engines now rated? What is the expression of a horse-power?"

Can. "By the pounds of steam or what is equivalent to it, pounds of water used per horse power per hour?"

Insp. "Is there any better way of estimating the economy than to say an engine exerts a certain number of horse powers?"

Can. "Yes, sir; it is the only way. An engine may exert 50 h. p. with 36 lbs. of steam to do the same. By pounds of steam is meant here the actual weight of it, not its elastic force."

Insp. "How can you find the weight of steam used per horse power per hour?"

Can. "By the indicator cards taken from the engine, and by the dimensions of the engine itself; that is to say, the cubic inches filled with steam, such as the ports, passages, clearances, etc., etc.; also by tabulated data compiled for this purpose in various handbooks and treatises on the indicator. The weight of one cubic foot of steam at 60 pounds above the atmosphere is 1759, and the number of cubic feet used per minute multiplied by this decimal gives the total consumption of steam per minute or per hour. The same tables also give the relative volumes of steam and water, so it is easy to check the performance daily of any given engine in order to fix its economy."

Insp. "What method would you adopt to do this? Suppose you were in charge of the engine of a large cotton or woollen mill, and wanted to show the directors that you could run their plant with the least possible quantity of fuel, how would you go about it? What system would you adopt to check the steam and water consumption per horse power?"

Can. "If the engine had been running some years before I took charge of it, I would take cards from it and carefully estimate its performance and note its mechanical condition. If this was defective I would call the attention of those interested and insist upon repairs being made at once."

Insp. "Do you suppose they would pay any attention to you?" Could you make them believe that they were throwing money away daily on defective steam plant?"

Can. "If I could not, it would be my own fault. If I could not produce arguments which would prove themselves, I should think I was wanting somewhere myself. If the directors understood simple arithmetic I could show them the holes made in their pockets by leaky pistons, cards from cylinders, leaky valves, dirty boilers and bad firing and bad engineering generally."

Insp. "When you appear again I will ask you to be prepared to give something more definite on these points than generalities."

Can. "I will, sir."—*Mechanical Engineer.*

A Great Sea on Fire.

The shores of the Caspian abound with naphtha springs extending for miles under the sea, the imprisoned gases of this volatile substance often escaping from the fissures in its bed and bubbling up in large volumes to the surface. This circumstance has given rise to the practice of "setting the sea on fire," which is thus described by a modern traveler: "Hiring a steam barge, we put out to sea, and, after a lengthy search, found a suitable spot. Our boat having moved round to windward, a sailor threw a bundle of burning flax into the sea, when floods of light dispelled the surrounding darkness. No fireworks nor illuminations, are to be compared to the sight that presented itself to our gaze. It was as though the sea trembled convulsively amid thousands of shooting, dancing tongues of flame to prodigious size. Now they emerged from the water, now they disappeared. At one time they soared aloft and melted away; at another a gust of wind divided them into dark streaks of flame, the foaming, bubbling billows making music to the scene. In compliance to the wishes of some of the spectators our barge was steered toward the flames, and passed through the midst of them, a somewhat dangerous experiment, as the barge was employed in the transport of naphtha, and was pretty well saturated with the fluid. However, we escaped without accident, though for an hour longer on the unwanted spectacle of a sea on fire."—*Moscow Vedomosti.*

Olive can, 27 miles of Tuscan, A. T., shipped during October seventy-five tons of ore which gave an average return of over \$200 per ton.

IN THE NORTHWEST.

A Gigantic Coal Concern That is Booming Industrial Life on the Golden Coast.

The coal deposits near Washington lake, Puget sound, are attracting great attention from writers in the industrial press of California. Other deposits were years ago known to exist elsewhere on the sound, but about fifteen years since this one gave promise of being the largest, and also of producing coal of superior quality for general use. In '70 there were only a few men at work, and when the year closed they had only got in a distance of not over 55 feet, but even this short distance gave so much promise that a company was organized upon a better financial basis, and work prosecuted towards the close of '71 upon a larger scale, with the output of coal beginning to assume such large proportions that a railway to the mines was found to be indispensable. At first the coal was conveyed by rail from the mine to Washington lake, where the coal cars were placed on a boat, which took them to the opposite side, where they were landed on another railroad track, and thence they were taken to Seattle, where the coal was loaded into ships for the San Francisco market. The production increased rapidly, so that quicker and better conveyance was demanded, which resulted in a through railroad from Seattle to the coal-fields. The reputation of the coal for domestic and steam purposes grew so quickly that the output was not any too much for the consumptive demand. The controllers of the Northern Pacific railway, who succeeded Jay Cooke and his friends, recognized the importance of the mines, formed a joint stock company of several million dollars, and the stock and bonds were floated within a short time. With a large paid-up capital and under shrewd management, the new company made extensive improvements in the manner of working the coal-fields they had secured, put more miners to work, built a more substantial railway, put on better coal cars, and also enlarged its facilities for handling the coal in the Seattle depots. In San Francisco they also enlarged the facilities for handling the coal when received there. They bought their own sailing vessels, but soon discovered that they were not suited for the traffic, so they ordered the building of three iron colliers, having a combined carrying capacity of 8,000 short tons. They made improvements on their property at the foot of Beale street, San Francisco, so that it now has no equal on the coast. The property which is 550 feet square, in which there are coal bunkers 100x24 feet, has erected on it buildings and works of the most improved kind for handling large quantities of coal expeditiously, and so successfully is this done, that a cargo of 3,000 tons of coal is discharged and put in the bins in the short space of nineteen working hours. There are elevators conveniently arranged so that 300 tons of coal per day can be raised into them from the yard, and from them put into a vessel. There are several "runaway pockets" with 75 tons capacity each, from which teams load. There are four runaways, each having a hoisting apparatus for discharging vessels, and also scales to be used only when foreign coal is discharged, and then by customs officials. The Oregon Improvement company is said to be the only firm that keep the coal under cover, so that it goes out perfectly dry. The coal is unloaded from the vessels, then dumped into push carts holding 13 cwt. each, which owing to their construction, one man can handle with perfect ease. Although the company have over thirty trains of their own, they are compelled to hire a very large number more, so as to accommodate their extensive city trade. It must not be thought that, because the Oregon Improvement company owns its own coal mines in Puget sound, and has three large steam colliers in commission to bring a large proportion of the coal mined to San Francisco, they deal in this kind alone, for so large a company carry all kinds of coal so as to accommodate the trade. Their yard and buildings, &c., have a capacity of 33,000 tons, and they keep in stock their own coal, and also the Cardiff, Cumberland, Cannel, Scotch, Wellington, Chace river, three kinds of Sydney coals, besides all and any kind in demand. That the company's Seattle coal is more sought after for household use, it is said to have been proved recently, when the mine was temporarily closed down, and no supplies could be had in San Francisco. Consumers complained very much about the coal supplied in its place, and were pleased when the Seattle coal came on the market again.

For the past two weeks Chief Traveling Engineer Gilbert Steffy, of Reading, Pa., has been experimenting at the Palo Alto round house with soft coal in starting the fires of different styles of locomotives, and has succeeded in determining that a great saving can be made. The *modus operandi* is as follows: The wood to be used is chopped into the size of kindling and spread out in the fire box near the doors; it is then lighted and about three bushels of soft coal thrown over it, which is soon reduced to cinders and scattered over the entire box, after which a covering of buckwheat coal is put in and the fire is in operation. As the annual bill of the company for wood is about \$500,000 and the new process of lighting is proven to effect a saving of one-third per cent., it has no doubt come to stay.

Danger of Water in Steam Pipes.

Many are not aware of the danger that ensues when condensed water is permitted to accumulate in steam pipes, and no means provided for drawing off, by suitable openings provided with cocks arranged or located at the lowest points in a line of pipe. The danger arises from the fact that when the steam encounters a body of cold water there is rapid condensation, causing a vacuum, and the violent rush of the water with which the water is driven along the pipe like a waterhammer, against elbows or the casing of a valve, sufficient sometimes to drive a hole through the solid metal, as if it had been punched with a solid ram of steel. Connecting pipes between the boilers of a battery, a part of them having been cold for a few days, have been ruptured by opening the valves that closed the connection with the boilers under pressure of neglecting to properly drain the pipes. Men in charge of boilers have been seriously injured by neglecting these precautions. Not only valves have been ruptured, but steam pipes are sometimes split, in some cases for several feet of their length. It has been proved beyond question that no steam fitter who neglects to provide for the easy and rapid removal of all water of condensation, is fitted or competent to be trusted with the supervision of work requiring the intelligence and caution which has been shown to be necessary in laying lines of pipe for carrying steam. There is no doubt that the reliable automatic steam-trap, which will drain the water off from the line, will prevent these disasters, and it is the duty of persons in charge of the erections of steam lines to see that ample means are provided for preventing the accumulation of water. Every low part or place in the line should be provided with traps or drain-cocks, ample to carry off in a few minutes any water in that part of the line. It is often found that through false notions of economy the cocks placed for draining off the water are too small, and it often happens that the man who is charged with the duty is hurried, and the work is only half done. The best economy is to arrange so that a line of pipe can be quickly and easily drained, and, by this, the possibility of disaster is removed.

About Silver.

Senator Sherman does not seem to realize that his silver views are absurd. The proposition to put silver enough into the silver dollar to make it equal to gold is no solution to the silver question. If the value of silver is to be measured by gold the weight of the silver dollar would change with each quotation. The silver dollar of 412 grains is as old as the government. It was a legal tender from 1792 to 1873 when its coinage was stopped. In '78 when its coinage was renewed, the law declared the dollar to be a legal tender for all government dues. Why then should we increase its weight? Is it not only legal money as it is, but it is its worth as much of anything but gold as it ever has been. Under these circumstances the true solution of the silver problem is to use silver for all purposes for which money is used. If it will buy as much wheat, or corn, or cotton, or as much general merchandise now as it would when it was worth as much as gold, there is no injustice done to bondholders in paying them with silver. The gold conspiracy has been the cause of much ground and lofty tumbling in questions of finance. To convince the public that bonds should be paid in gold, certain men, Sherman included, have performed some strange feats. They have shut their minds to facts. They ignore statements that do not coincide with their peculiar views. Mr. Sherman is, in other respects, an able man. There is much reason to believe that he understands the silver question much better than he pretends to. What does he mean by the statement that a dollar must be a dollar? What right has he to demand that the value of the silver dollar shall be measured by the gold dollar? Does he contend that the law of '78 which declared the 412-grain dollar a legal tender for all debts is inoperative? Does he assume that the money lenders can make a law of trade that nullifies a law of Congress? The truth is that Sherman has embarked in the gold conspiracy boat, and does not realize that the time has come to jump out.—*San Francisco Call*.

D. H. L. asks how to get rid of the exhaust in the mines, on account of the unpleasantness of steam. Tell him to attach a special condenser. I will tell you what I saw in Wyoming about fourteen years ago. The Rock Springs coal mine had a Cameron pump with about a four-inch discharge to keep the water out of the mines. The boiler to the pump was on the surface, and the pump was over three hundred feet away. A few feet below the pump there was a tee in suction, and one branch ran a few feet to what the miners called a sump, and the straight pipe ran about eighty feet further to another sump. Each pipe had a stop cock to regulate flow, and the pump drew from bottom at once. The exhaust was run into the sump near the pump, and the water allowed to cover the end of exhaust pipe about four inches, or enough to keep the exhaust from opening the water and escaping into the air. The height of water in pipe was regulated by the stop-cocks, and the water ran in fast enough so that the temperature was raised but a trifle. This arrangement seemed to work good, and as the pump only made about 75 or 80 revolutions per minute, the back pressure was slight.—*Frank Hill in American Machinist*.

LABOR TOPICS.

"The longer you are out of work the more you distrust your own ability to do anything and the more the world distrusts it, too," is "a cold truth" offered by *Work and Wages* for the consideration of those concerned.

Our capitalist classes have a duty to do that many of them don't seem to understand. It is not to accumulate money, but to keep it in channels where it can assist the natural development of the human needs and human happiness.—*Springfield Guardian*.

Should the man whose weekly wages are gone in two days for beer and faro stand on the streets and howl about the oppressions of capital? Less beer it can assist the natural development of the human needs and human happiness.—*Springfield Guardian*.

Pittsburg is now rejoicing in the absence of strikes and lockouts. There might be more cities enjoying Pittsburg's novel experience. The "Smoky City" has a very sensible system of wage adjustment. It would be well for all great labor centres to adopt the method of sliding scale wage adjustment.

An eight-hour pin is out. The wearing of a pin will not secure eight hours, it requires something more than mere form and show to show truly what the kind worn conspicuously by windbags who ran at first fire. Dumb show and noise won't win.—*Baltimore Labor Free Press*.

Workingmen cannot expect wages to be higher than the law of supply and demand will admit, nor to win their strike so long as laborers can be had to do the same work at lower wages. But there are conditions behind the law of supply and demand, and these conditions our workingmen are industriously studying.—*The Leader*.

Every human being who is not born to a fortune has a labor problem of his own to solve, and the time will probably never come when a very large number of men will not keep trying to make somebody else solve it for them. The greatest need of our age seems to be the buckling down of each man to his own labor problem. Every man should try to help his neighbors to bear his burdens, but every neighbor should refrain from trying to unload on him.—*Evening Post*.

Sunday work has been forced upon wage workers to a constantly increasing extent in recent years, and anything that will check it, if not in itself unreasonable, is to be gratefully welcomed. But the late decision of the full bench of the Massachusetts supreme court in the case of Frank Dexter, the Worcester barber, is sweeping in its interpretation of the Sunday law; and impartial enforcement according to the spirit of this decision would send three-fourths of the orthodox church members of the commonwealth straight to jail.—*Work and Wages*.

When a president of some great manufacturing concern runs away with the funds, the newspapers all have words of sympathy for other capitalists and corporations that are involved, but seldom mention the poor workers. They are really damaged more in proportion than the money lenders, for the latter suffer loss from their surplus, while the former suffer for the necessities of life. They are likely to have small wages still further reduced, and perhaps withheld for weeks, and the chances are that many of them will be thrown out of employment altogether.—*Hartford Examiner*.

Trial of An English Compound Engine.

Tests were recently made at South Kensington, England, of a compound non-condensing engine, built by Davey, Paxman & Co., of Colchester. The high pressure cylinder was 12 inches, and the low pressure 20 inches diameter, with stroke of 24 inches. The engine is what is known in England as the semi-fixed, or under-type, called the semi-portable. The boiler is of the usual "locomotive" type used with such engines, the engine being located underneath and to the sides of the barrel. The boiler contains 100 tubes, 21 inches diameter, and 71 feet 7 inches long. The total heating surface is 10,100 square feet. The ordinary grate surface is 19-2 square feet, but was reduced for the trial to 15-3 square feet; smoke-stack, 17 inches diameter. The engines were run at 104 revolutions, with an average steam pressure of 107 lbs. The admission of steam to the high-pressure cylinder was controlled by automatic cut-off governor. The cylinders are provided with steam jackets, but these were not in use during the trial. The indicated horse-power was 109-5, almost exactly equally divided between the two cylinders. The consumption of coal per indicated horse-power per hour was 2-56 lbs. The water evaporated per pound of coal was 9-42 lbs.—equivalent to an evaporation of 11-35 lbs. from and at 212°.

The board of trade of Leavenworth, Kan., have accepted the proposition of the Riverside coal company, J. A. Borard, of Kansas City, president, to sink a shaft in the city. The conditions of the proposition are that the city will subscribe \$10,000 stock in the enterprise, \$1000 to be paid for each hundred feet in depth the shaft sunk until 750 feet is reached, when the balance becomes due. Work will begin at once. It is also reported that the Atchison, Topeka and Santa Fe railroad contemplates sinking a shaft in Leavenworth.

WOOD FOR FUEL.

Western Speculations as to Its Advantages and Dissadvantages in Household Use.

This country is more abundantly supplied with fuel than almost any portion of the habitable earth. There is also a greater variety of substances that can be employed for generating heat. We have anthracite, bituminous, semi-bituminous and cannel coal. We have vast peat deposits that have never been utilized. A large portion of our territory is covered with forests that furnish excellent wood for fuel. Petroleum is abundant and cheap, and both the crude and refined oil are extensively used for feeding fires. Naphtha, which is derived from petroleum, is also employed for using in stoves employed for cooking food and generating heat. On many farms a sufficient amount of corn-cobs is produced for supplying the kitchen fire. Sunflowers are easily raised, and their stalks and heads make excellent fuel. We know little of the cost of keeping warm during cold weather that must be met by the people of other countries. Few of our people are obliged to practice much economy in the use of fuel. They are able to warm all the rooms in their houses instead of a few, as in the cases in many parts of Europe.

Which is the best fuel to use depends on circumstances. Bituminous coal is abundant and cheap in all the western and in most of the southern states. It is easily ignited and produces a large amount of heat. Experiment has demonstrated that it is the cheapest fuel for generating steam in locomotives and stationary engines. It is in many respects an economical fuel for use in farm-houses, but there are very great objections to it. It is dirty to handle. Burned in an open grate, it is likely to throw off much smoke which passes up the chimney uncondensed. During unfavorable weather much coal smoke passes from an open fire into the room. It vitiates the air that is taken into the lungs, and soils everything it comes in contact with. It discolors books, wall paper, and the ceilings of rooms. It penetrates closets and drawers and soil their contents. It deposits soot and tar in chimneys and renders them dangerous. It is difficult to burn common bituminous coal in a cooking or heating stove and not suffer from the annoyance of smoke and vile gases. The use of soft coal makes it necessary to employ the frying kettle instead of the gridiron in cooking meats.

Anthracite coal is open to few objections. Burned in an open grate or a properly constructed stove it produces a steady heat and throws off no smoke. A fire of hard coal is somewhat hard to kindle, but it will "keep" a long time. With a properly constructed stove there is no necessity for having the fire go out or becoming low for a period of weeks or even months. It is cleanly to handle, does not attract moisture, and produces but a small amount of ash. It is the favorite fuel for domestic purposes in large towns and cities for many reasons. It is easily stored, requires no preparations before it is used, and its combustion does not result in soiling the house or anything it contains. However excellent wood may be as a fuel its use will no longer be general in large towns. A large space is required for storing it, and in a city space, even the open air, is expensive. As it is bulky, it is costly to transport in cars and boats. Yard or dock room for it is expensive. The cost of sawing and splitting wood in a city is large. If the work is done in a wood yard customers have no assurance that they get the amount they pay for. As a rule they have no room on their own premises for preparing cordwood for the fireplace or stove.

Few western farmers, however, can use anthracite coal for cooking purposes or for heating their dwellings. The cost of transporting it is too great. They must accordingly choose between bituminous coal and wood. If there are no trees on their own land or in the neighborhood where they live, they are compelled to use soft coal till trees can be raised. Few will question the advisability of raising a supply of wood at the earliest period possible. A good wood lot serves to make a farmer independent in the matter of fuel. It saves a large sum every year. It adds to the beauty and comfort of the farm. It attracts songbirds, and breaks the force of the winds. It furnishes a pleasant retreat during the summer. A farmer with a wood lot of his own can have a supply of the best fuel without the expenditure of money. He can chop wood at times when he has no profitable employment. He can haul it to the house when there is nothing for his team to do. He can prepare it for the stove and fire-place during the winter, or at other times when he can not work in the fields. A good wood lot furnishes security against anxiety when roads are impassable and the supply of coal at the nearest towns is exhausted. It saves trouble, care and money. It permits ease, contentment and comfort.

Well prepared seasoned wood is the best fuel for cooking purposes during the warm weather when it is not desirable to have the house made warm. It is easily kindled, and the fire it makes will become extinguished soon after the meal is prepared. With common, air tight stoves, which are inexpensive, sleeping rooms may be kept comfortable during the winter with very little trouble. Quite large blocks of wood can be burned in them. By closing the draft a fire can be kept in one of these stoves over

night without trouble and with very little expense. Sitting and living-rooms can be heated in a very satisfactory manner by the use of these stoves. They produce no dirt or smoke and do not vitiate the air. They are not cheerful, but the common soft coal stove is not. If a farmer raises his own wood he can afford to have at least one open fire in his house during the winter season. This will insure a cheerful room. Large logs, knots, and even portions of stumps can be burned in an open fire place. An open wood fire is a luxury which any farmer can enjoy if he takes the trouble to plant trees. White wood, silver-leaved poplars, and willow trees will grow from cuttings, and furnish fuel in a few years from the time they are stuck into the soil.—*Chicago News.*

Machine and Hand Drills in Mines.

At the Drumlunnon mine, in Montana, for the purpose of running machine drills and small pneumatic hauling engines underground, a compressor is employed of sufficient capacity to work from 25 to 80 drills, each having a cylinder of 3½ inches in diameter. These drills are used in sinking, driving, rising and in stopping out quartz for the mills, and it is found that they not only materially quicken the result of each operation, but render the undertaking less dependent upon manual labor than if hammers and drills were alone in use. The approximate rate of speed and relative number of hands consequent on the use of the two methods will be seen from the following figures, giving rate of speed per month:

Machine Drills.	Hammer and Drills.
Sinking shafts..... 50 to 55 feet.	15 to 20 feet.
Driving levels..... 50 to 90 feet.	18 to 25 feet.
Stopping ground, per drill..... 300 to 400 tons.	60 to 70 tons.

The relative number of hands required (15 machine drills in use) is as follows:

Hammer and drillmen required to do the work of 15 drills.....	150
Drillmen required to equal work of 150 hammer and drillmen.....	30
Difference in number of hands.....	120

It is stated by consulting engineer, John Darlington, in his report to the directors of the company, that in the use of machine drills, the cost of explosives is nearly two-fold more than the cost incurred in the use of hand drills, that is, to do an equal quantity of work, while the cost of maintaining the compressor, together with cost and repair of drills must be taken into account. Against these items, however, must be set the cost of 120 miners' wages per day, the impossibility of combining a number of men together to do the work of a single drill, the rapid speed with which the mine is opened out, and the comparative saving of "dead charges" consequent on the attainment of a high rate of speed in the execution of underground work.

Collapse of Flues.

It has been found in nearly every instance that where flue boilers are extensively used the collapse of the flues figures very prominently in the expense accounts of the owners. Inquiry as to the causes of accidents of this nature and the adoption of precautionary measures have not been neglected, and yet it is questionable whether much good has been done and whether the condition of collapse are always properly recognized. The low-water theory which has hitherto been applied so uniformly and conveniently to all cases of boiler accidents has naturally been pressed into service in this matter also, though with more reason than ordinarily, since low water is undoubtedly a factor of great importance. Still it should not be credited with as much weight as it receives. Boiler flues, it should be remembered, are rarely, if ever, perfectly round, but have flat places which are often responsible for a good deal of mischief. An imperfect flue of this kind may give satisfaction for years if worked under favorable conditions and within the fixed limit of pressure. If, however, a heavier demand may be made on the boiler, and this pressure be exceeded, the flat portion of the flue will readily increase in area, and the strength of the flue will be correspondingly diminished. It is not difficult to see that low water would produce a similar result, the flue sheets without the protective covering of water becoming overheated and yielding to the pressure. Again, a deposit of scale would work in precisely the same manner, showing that all these agencies should be duly taken into account in a case of collapse. Where the decreased resistance of a flue is the result of overpressure, the remedy is at once apparent. The use, in the flues, of strengthening rings, Galloway tubes and other devices designed to increase resistance to collapse, is ample proof that the weakness of the flues is generally recognized. With good care, however, they are not liable to give serious trouble, and it will certainly pay steam users to be guided more than hitherto by the requirements of safety, convenience and durability.

IMPORTANT.

When you visit or leave New York City save Baggage, Express and \$3 Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot. 63 elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best. Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city. 23-ly

The coal mines of Nova Scotia are very dull and comparatively few of them are running except at intervals.

SPONTANEOUS COMBUSTION.

Scientific Theories as to Its Cause in Coal Mines and How Its Danger May be Lessened.

Alfred Bache, of the English institution of civil engineers, writing on the subject of spontaneous combustion in collieries, says: "Oxidation of the hydro-carbons on exposure to air cannot develop heat enough to ignite the coal," and the only way in which he can account for spontaneous combustion in such coal is by the presence of dust or fine slack in the midst of any heaps that are found to be heating. Dust and fine slack he considers capable of exerting a condensing power upon the combustible gases that are ready to escape from bituminous or gaseous coal, and also upon the oxygen of the air, and the heat so developed may become sufficient to fire the gas, and thereby the coal. While therefore spontaneous combustion may occur in any colliery, whether the coal contains pyrites or not, it is more particularly in seams of coking coal containing pyrites that, as the workings progress, the pillars left standing grow hot rapidly, under the combined action of oxidation of pyrites, pressure and subsidence of roof, and oxidation of hydrocarbons through condensing power of dust. It is the pyrites, however, which, wherever present in any appreciable quantity, plays the principal part in starting ignition, and thus constitutes the primary cause of fire; the other causes are then but secondary, although they may so far supplement the first thus given as to make a seam containing but a little pyrites appear readier to fire than one containing much more." The development of spontaneous combustion is considered firstly in the case of masses of coal; such as pillars left in working. Really solid pillars never fire; those that do are always fissured with numerous cracks and are more or less crushed. Outbreaks of fire are encouraged by the presence of any coal crushed small, which, in its finely sub-divided state promotes the chemical actions that induce heating. First fire smolders at the bottom of the innumerable cracks by which the pillars have become fissured under the crushing load they have to support. Then the walls of the cracks get red-hot and burn, sometimes bursting suddenly into flame where the previous heating has covered them with bituminous matter. The tarry smell thus occasioned often betrays the existence of fire before it has become visible; and so difficult it is to find its actual seat, that often it is not discovered until it has crept upwards towards the air current at the mouth of the chucks, and has ignited the crushed coal behind the timbering of the roads and then the timbering itself. The danger is augmented wherever there are timbered excavations overhead, and still more wherever a timbered drift has been pushed forwards under a mass of crushed coal overhead. Through such a mass air circulates easily, heat and moisture collect there, and fire breaks out quicker than where the overhead coal has been got out previously. Wherever crushed coal can be harbored on or amongst the rubbish that is packed into the goaf, fire is sure, sooner or later, to break out. It begins at some distance in from the roads and creeps out gradually towards them, igniting on the way any timber that may have been left buried in the gob-packing; the pungent wood smoke gives immediate warning of the fire. Pillars purposely left unworked, either for maintaining a shaft or because the coal in them is not good enough, are also liable to take fire. The load bears unevenly around them, they wash and crack and warp, and small crushed coal accumulates next to the gob-packing; the heavier the pressure the sooner do the pillars heat and fire danger arises, or by the introduction of a lamp so shielded or otherwise arranged as to make it impervious to draft, and thus to nullify any velocity of current. Practical miners would not be likely to adopt the former, for they were well aware that with slow sluggish currents in a seam which gave off fire-damp freely it was impossible to keep the general atmosphere of the mine comparatively pure, that is, clear of what is technically termed a "cup" on the lamp, or so to ventilate the broken parts of the roof as to keep them clear of explosive gas. With sluggish currents in a fiery mine, its normal condition would be one of such peril that no prudent manager would tolerate under such a condition of things, any local explosion of fire-damp, which under more favorable circumstances might have been harmless, would by reason of the dust and heat set up, extend itself throughout the colliery.

Some one writes to the New York Tribune, in sarcastic vein, about a recent utterance by a well-known reformer, of the oft repeated assertion that drink is at the bottom of most of the troubles of working people. The writer says: There is no doubt of it. Every saleroom in our big dry goods stores keeps a gin bottle under her counter. Every sewing machine has a special drawer for the seamstress to put her demijohn of bourbon in. The stale beer dives of the Fourth ward are supported mainly by the patronage of girls from the up-town shops, who come down there in men's clothes, disguised as tramps. It was a milliner who invented "working the growler." Mrs. Campbell tells of a woman who lost her pay because her machine skipped a few stitches in a garment. Doubtless the woman was drunk, and the machine too.

INSPECTION WORK.

A Shrewd Scheme to Cover a Future Move—Collieries to be Leased but the Company to Purchase the Coal.

A party of Reading officials have just concluded a "thorough inspection of that company's mines. There seems to be a superabundance of colliery inspection going on just at this particular time. The inspectors, too, are covering their tracks with scores of discharged employees, on a plea for economy of management. This is by many regarded as a mere blind, and the assertion made that in a few months from now the company will not be operating a colliery in the coal region. As President Corbio stated a few days ago, the company will not lose control of its coal mining properties. But it is also true that it will not operate them. It is the purpose of the management to lease out its collieries to individuals, and it is undoubtedly true that the inspectors now in the coal fields, are inspecting the difficulties and expenses involved in mining the dusky diamonds in the different mines with a view to fixing the rentals. The company will retain control of the property in so far that it will be stipulated in the leases that the coal mined must be sold to the Reading company at the breakers at the ruling market price. This will give the company the benefit of the tonnage. Of course this arrangement is liable to a miscarriage should the property go a sale under foreclosure. However, strenuous exertions will be made to prevent this, as such a proceeding would nullify certain valuable franchises the corporation has now in force and effect. The policy in a nutshell, that has been fixed upon, is to get rid of the canal, coal, iron and other properties that have been eating up the profits of the railroad by letting them go to individuals and syndicates under stipulation that they shall still continue to be feeders of the railroad.

MINING COMPANIES.

The Charlotte mining company has been organized at Charlotte, N. C.

Bucksink mining company, at East St. Louis; capital stock, \$2,000,000.

The Warrington stone and marble company, at Chicago; capital stock, \$100,000.

The Valeceto mining and smelting company Baltimore, has been organized with a capital of \$18,000.

The Preston county mining company, capital stock \$1,200,000, has lately been incorporated in Preston county, W. Va., to mine coal.

The Elare coal company, has been incorporated at Memphis, Tenn., to mine coal, iron and other minerals, erect blast furnaces, rolling mills and coke ovens, &c.

"The consolidated Huronian gold mining company, of Ontario," at Port Arthur, Ont. Capital stock \$80,000 sterling or \$1,300,000, with an additional working capital of £100,000 sterling, or \$500,000.

Literary Note From The Century Co.

The sales of *The Century Magazine* have gone up over 30,000 copies in six weeks, since beginning the "Life of Lincoln." A second edition of December was issued on the 15th. A veteran New York publisher predicts that the permanent edition of the magazine will go beyond 300,000 before the completion of the Lincoln history. The January installment, which is said by the editors to be of the most surpassing interest, occupies thirty pages of the magazine, and treats of Mr. Lincoln's settlement in Springfield; his practice of law in that city; the Harrison campaign; Lincoln's marriage; his friendship with the Speeds of Kentucky; the Shields duel; and the campaign of '61. The illustrations are numerous, including portraits of Joshua Speed and wife, of Mrs. Lucy G. Speed, Milton Hay, President Harrison, General Shields, William H. Herndon (the law partner of Mr. Lincoln), and Mr. Lincoln himself, from the photograph presented by him to Mrs. Lucy G. Speed, in '61. Pictures are given of the house where Lincoln was married, also where he lived after his marriage, etc., etc.

The coal traffic of the Pennsylvania railroad is growing to enormous proportions, and the resources and ability of that company to recoup its losses of traffic in one section of the state by increasing its shipments of coal and coke from other districts may be judged from the following figures: The total tonnage of coal and coke passing over the Pennsylvania railroad division of that company's lines for this year to Dec. 11th are reported by Auditor of Freight Receipts, George M. Taylor, at 14,265,487 tons, being an increase of nearly a million tons over the tonnage of the comparative period of last year. Of the above total 10,924,007 tons were coal and 3,371,480 tons coke, an increase of 70,049 tons in the former and 874,143 tons in the latter. It will be remembered that, owing to the strike in the Clearfield bituminous coal region, the Pennsylvania railroad lost this year compared with '85 over half a million tons of soft coal freight, while from the Cumberland district its receipts of coal fell off 162,000 tons.

Lehigh Valley Coal Tonnage.

The following tables give the shipments of coal over the Lehigh Valley railroad and branches, as reported from the forwarding office at Packerton, Pa., for the week ending Dec. 18, 1886:

Anthracite Coal Received and Forwarded

From PENNA. & N. Y. R. R.,

AND

WYOMING REGION.

	Tons.	Cwt.	Tons.	Cwt.
Sullivan and Erie Collieries	93	10	93	10
Pleasant Valley do	1,695	09	3,484	13
West Pittston B'ch do	2,093	16	4,113	11
Del. & Hud. Canal Co.				
All other Collieries	38,552	05	96,315	00
Lehigh Canal, Mauch Chunk				

Total	42,435	00	104,476	14
Same time last year	37,315	09	107,477	14
Increase	5,119	11		
Decrease			3,201	00

HAZLETON REGION

For Rail	47,319	02	43,747	03
do to S. H. & W. R. R.	4,106	16	4,312	01
Lehigh Canal, Mauch Chunk			124	08

Total	49,425	18	141,483	12
Same time last year	59,787	13	176,705	15
Increase				
Decrease	10,351	15	35,222	03

UPPER LEHIGH REGION

For Rail				
Same time last year				
Increase				
Decrease				

BEAVER MEADOW REGION

For Rail	18,084	00	48,581	14
do Rail to S. H. & W. R. R.	18	15	197	07
do Lehigh Canal, Mauch Chunk				

Total	18,102	15	48,779	01
Same time last year	18,476	19	51,167	05
Increase				
Decrease	374	04	2,388	04

MAHANAY REGION

For Rail	36,056	00	84,859	01
do Lehigh Canal, Mauch Chunk				

Total	36,056	00	84,859	01
Same time last year	35,288	02	102,066	09
Increase				
Decrease	767	18	17,197	08

MAUCH CHUNK REGION

For Rail				
Same time last year				
Increase				
Decrease				

TOTAL ANTHRACITE RECEIVED

From Wyoming Region	42,435	00	104,476	14
do Hazleton do	49,425	18	141,483	12
do Upper Lehigh do	18,102	15	48,779	01
do Beaver Mead. do	36,056	00	84,859	01
do Mahanoy do				
do Mauch Chunk do				

Total	146,019	13	379,598	08
Same time last year	150,838	03	437,607	03
Increase				
Decrease	4,818	10	58,008	15

Forwarded East by Rail from Mauch Chunk	119,435	17	311,840	13
Same time last year	121,486	07	352,409	14
Increase				
Decrease	2,050	10	40,569	01

Forwarded East by Rail from Mauch Chunk	119,435	17	311,840	13
Same time last year	121,486	07	352,409	14
Increase				
Decrease	2,050	10	40,569	01

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COAL MINE NOTES.

The tunnel being driven from the Ross seam in the Waddell mines at Luzerne borough Luzerne county, Pa., is now very close to the Red Ash seam.

The Hillsdale coal and iron company is cutting the rock for a new shaft, in the upper end of Jernyn Luzerne county, Pa. The new shaft will be sunk through all the coal measures.

The No. 8 breaker of Pennsylvania coal company at Pittston, Pa., has been extensively repaired and its capacity greatly increased and the suspension that was enforced lifted.

The Pennsylvania coal company is reported to have sold a liberal quantity of coal, afloat in boats, at a concession, and to be in harmony with the other companies now, and firm in prices.

The Susquehanna coal company is tunneling at their No. 2 colliery, at Nanticoke, Pa. The opening will run from the Red Ash seam about 600 feet, and will require eight months time to complete.

The smaller sizes of coal have become very scarce, and have a strong upward tendency in price. This is said to be due to much less coal than usual being crushed this winter, and to the smaller output.

A Pittsburg firm is engaged in running cables through the gangways at the Logan colliery, Centralia, Pa. By this new electric invention, direct communication can be had with all parts of the mine.

The Red Ash seam has been pierced by the proving bore-holes on the tract of the Wyoming coal company at Forty-Fort, Pa., and it has been found to measure eight feet and seven inches. The last fourteen feet contains only seven inches of slate.

The Grassy Island coal company are opening up a new body of coal, designated as the Slope seam, near Winton, Luzerne county, Pa. The seam is eight feet seven inches thick and a bright anthracite. The drift is now in about 500 feet, and will over 6,000 feet long; it will have an additional lift above it towards the outcrop of 1,900 feet more, and when completed will open an area of coal 6000 by 2000 feet. This company is also sinking a new shaft to the seam, with an opening 11x22 feet in size.

Lawrence & Brown were enjoined on the 6th from mining certain coal under Mahanoy Plane, Schuylkill county, Pa. There are 450,000 tons of coal tied up, of which 150,000 to 200,000 tons is merchantable. In view of this large amount their counsel asked the court on the 14th for time to prepare an answer. Mason Weidman, Esq., for the landowners, concurred in the request for a postponement and Jno. F. Whalen, Esq., representing the company, agreed to it. January 31st was fixed for filing the answer.

BUSINESS POINTS.

A factory to manufacture wagons and sleighs is to be started at Chambersburg.

A factory with a

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department. Letters should reach the office by Tuesday to secure insertion the current week.

Ventilation and Other Questions.

Editor Mining Herald and Colliery Engineer:

SIR:—Perhaps the following may be useful to the inquiries in a late issue. "Young Colliery Manager" will find it very costly enlarging the sectional area of his intake to increase the quantity of air required from 6,250 to 22,500. Let us suppose the roof is good, which very probably is not the case; then to obtain approximately near the quantity required he must enlarge his airway from 5 ft. by 5, to 8 ft. high by 9 wide, granting that the present power is 600,000 units, and by a series of calculations to approximate near the size of airway required, no increase of power. Suppose the power increased so as to obtain the power required, then the velocity would be about 15 ft. per second, a velocity easily obtained with power, bearing in mind the rule, the quantity increases as the cube root of the power; in his case a treble quantity required means twenty-seven times the power, and of course if a furnace, twenty-seven times the quantity of coals burnt. But cannot other means be adopted, is it not possible to increase the quantity by splitting? the 6,000 ft. being driven, and no expansion or enlargement of the workings. I think preparations ought to have been made for splitting before the aircourse was driven 3,000 ft. to mention an increased distance of 6,000 ft., and the workings must be in a very peculiar form if it is not possible to do so.

"Young Colliery Manager" must come as far outbye to obtain his first split, and the next most available point for the other, and he will find that by carefully splitting his air as his works advance and increase in size, he will be able to obtain the quantity required.

Again, if furnace ventilation, is it not possible to enlarge the furnace, and to make other practical improvements to increase the heat producing capacity of the ventilating power employed? But if the mine is to continue to increase in size, and the quantity also increase, would it not be most advisable to erect one of the numerous make of fan, Guibal and Schiele? Any of these means judiciously applied would be more effectual and less expensive than enlarging the airway to increase the quantity of air.

Logarithms.—The log. of 2.19 is 0.340444, that is, there is no characteristic, the decimals being termed the mantissa. Converting the fraction, $\frac{1}{5}$, to a decimal we have .4375, the log. being 1.640978. Proceeding in the usual way we find the 2.19 power of $\frac{1}{5}$ to be .25325, its log. 1.503541. Again, the 2.19 root of .25364 is .3781; the log. of .25364 is 1.45276, it is rather difficult dealing with negative characteristics in the matter of division and multiplication. We must also bear in mind that the logarithms of all proper fractions are negative, but the mantissa is positive. The difference of the log. of the numerator and denominator of a fraction subtracted from 0, is equal to the mantissa of the log. of the decimal into which the fraction is converted, and is positive.

The scale to which a plan is drawn depends upon the purpose intended for, from one to four chains per inch; two chains per inch a common working plan. Other scales are adopted, but perhaps "Deputy" better understands chains, feet, and inches than the other divisions adopted. The temperature of an upcast shaft will depend upon the size of furnace, the quantity of coal consumed, and the size and conditions of return, or the quantity of air that will pass through the furnace; for "Deputy" must know coal will not burn without air. All the air that enters the upcast is not—to use a common expression—consumed; only that portion that passes through the fire; it is not necessary; a furnace is to produce raeification.

Ventilation.—A boiler furnace is to produce heat, hence only sufficient air is permitted to enter, the oxygen of which enters into combination with carbon in the coal, and we say the coals burn. Let "Deputy" observe how careful a boiler fireman is to prevent an excessive quantity of cold air entering the furnace, and how necessary a ventilative furnace should have free action; he will then understand it is not necessary to have an excessive heat in the upcast shaft.

"Student" must remember shafts are constructed first, and if a shaft is say 14 ft. diameter, yes or less, if the air can pass round the working face and through the returns, it will go up or down the shaft; so far as my observations go the difficulty always appear to be inbye. His shaft must be about 18 ft. diameter. If "Student" will get some elementary work on hydraulic engineering, he will find the

matter therein explained. To say which is the correct rule is rather difficult, when each author claims the correctness of his own; and only those actually engaged in hydraulic engineering can rightly answer these questions. If "Student" was an engineer, and had to erect a hauling engine underground in a deep mine with a bad roof, he would have to ask himself several questions:—First, was it safe to erect boilers?—if not, could the steam be conveyed down the shaft without loss through condensation; or will the pipes never burst, or joints leak?—easy things to be remedied in a shaft. What use to make of or where to convey the waste steam? If compressed air is used, will it, when permitted to escape, assist the ventilation of the mine? Suppose to prevent any and all of these accidents, the engine is erected at bank,—the ropes must not hang loose in shaft—in the boxes—how easy to find and repair? "Student" must consider all these matters, and then try and write an essay on the advantages of compressed air for underground hauling, or pumping engines.

Yours Respectfully,

New York, Dec. 6, '86.

Arithmetical.

Editor Mining Herald and Colliery Engineer:

SIR:—The solution given by "Morganus" to the first of the two questions proposed by "Geo. W. Walker," in a late issue, is quite correct, but the details of the operation are not very clearly given, but since the result is correct it will be better left alone. Question No. 2.—What is the 2.19th root of .25364?

Here log. (.25364) $\div 2.19 = \frac{1}{2.19} \times \log. .25364 = \frac{1}{2.19} \times 1.4527675$

The integral part of this logarithm being negative and the fractional part positive, renders it multiplication by 2.19 , or rather its division by 2.19 , a somewhat difficult operation, but by reducing the fraction $\frac{1}{2.19}$ to a simple decimal the operation will not only be more easily performed but more easily understood, $\frac{1}{2.19} = .456621$; thus it will be seen that

(.25364) $\frac{1}{2.19} = (.25364) \times .456621$ and log. (.25364) $\times .456621 = .456621 \times 1.4527675$. Since the logarithm is partly positive and partly negative the multiplication of the two parts should be separately performed, and the difference of the two products will be the logarithm of the number required as answer to the question.

Now .456621 \times .4527675 = .2067431
And .456621 \times 1 = .456621

Difference = 1.7501221
= log. .5624993

\therefore (.25364) $\frac{1}{2.19} = .5624993$.

If any of your readers will apply the binomial theorem to the two questions and wade through a mass of figures they may, without the use of logarithms in any form, test of accuracy of the answer already given.

Yours, &c.,

Nenia, Ohio, Dec. 10, '86.

Ventilation.

Editor Mining Herald and Colliery Engineer:

SIR:—Answer to "Young Colliery Manager":—Aircourse 5 ft. by 5 ft., and 8,000 feet long, passing 6,250 cu. ft. of air per minute; required the size of aircourse to pass 22,500 cubic feet of air per minute, the length being the same in each. Let a = area of section, p = pressure per square foot of section, k = co-efficient of friction, s = square feet of rubbing surface, v^2 = velocity squared in thousands of feet per minute. Then

$$p = \frac{k s v^2}{a};$$

5 ft. \times 5 ft. = 25 ft. = a ; 20 ft. \times 8,000 ft. = 160,000 = s ; .0217 = co-efficient of friction = k ;

$$\left\{ \frac{6,250}{25 \times 1,000} \right\}^2 = .0625 = v^2;$$

$$.0217 \times 160,000 \times .0625 = 8.68 \text{ lb.}$$

pressure per square foot of section. Then to find size of aircourse to pass 22,500 cubic feet of air per minute under a pressure of 8.68 lb. per square foot, let q = the quantity, p the pressure, a the area, k , co-efficient = .0217, L , length of aircourse; and assuming it to be of a square section, then, by formula,

$$q = \left\{ \frac{p a}{k \times 4 \times L} \right\}^{\frac{1}{2}}, 1,000 \text{ a};$$

1,000 $a \sqrt{p a} = q \sqrt{k \times 4 \times L}$; $1,000^2 a^2 p a = q^2 k \times 4 \times L$; $1,000^3 a^3 p^2 a^2 = q^4 k^2 \times 4^2 \times L^2$; $1,000^4 a^4 p^2 = q^4 k^2 \times 4^2 \times L^2$; $1,000^4 a^4 p^2 = q^4 k^2 \times 4^2 \times L^2$. Therefore

$$a = \sqrt[5]{\frac{q^4 k^2 \times 4^2 \times L^2}{1,000^4 p^2}};$$

22,500 \times .0217 \times 4 \times 8,000 $= 123,580,371,600$,
600,000,000,000; $1,000^4 \times 5^8 \times 8^2 = 75,342,400,000,000$.

$$\frac{123,580,371,600,000,000,000,000}{75,342,400,000,000} = 1640236727;$$

logarithm of 1,640,236,727 = 9.2149066;

$$\frac{9.2149066}{5} = 1.8429813$$

number corresponding to logarithm 1.8429813 = 69.66 = square feet area of aircourse, or 8 ft. 4 in. \times 8 ft. 4 in. "Young Colliery Manager" should split the air, as directed by "Deputy."

Yours, &c.,

A. C.

Houtzdale, Pa., Dec. 16, '86.

Various Queries.

Editor Mining Herald and Colliery Engineer:

SIR:—Please insert the following in your next issue:

1. What would be the vertical rise in feet of a room rising at an angle of 17 degrees, whose horizontal length is 100 feet; also an easy method without the aid of trigonometry whereby any similar question could be worked out in figures.

2. Determine the scale in the construction of a plan upon which a square foot represents an acre.

3. How much more power will be required to pass an equal quantity through a shaft 6 ft. diameter than through one 18 ft. diameter.

4. If an airway passing 15,000 cu. ft. whose area is 45 ft., what would be the area if 10,000 ft. were only required?

5. What is the breaking strain of a steel wire rope 3 inches in circumference and a hemp rope of 5 inches in circumference?

Yours respectfully,

A NEW SUBSCRIBER.

Phillipsburg, Pa., Dec. 13, '86.

Air Pressure, Etc.

Editor Mining Herald and Colliery Engineer:

SIR:—In answer to "Learner," of Phillipsburg, insert the following:

1. It would pass four times the quantity, for the reason that the area of the 10 \times 10 airway is four times the area of the 5 \times 5 airway.

2. The following figures will suffice in answer to the second question:

$$9 + 9 + 6 + 6 = 30 \times 3000 = 90,000 \text{ ft.}$$

grubbing surface.

3. The pounds pressure per square ft. producing the ventilation in amine whose depth is 500 ft. and weight of a foot of air in downcast .084 lbs. and upcast .065 lbs. is as follows:

$$.084 \times 500 = .065 \times 500 = 10 \text{ pounds per square foot,}$$

Again $10 \div 0.763122 = 131 \text{ ft., motive column.}$

4. The greatest quantity would pass through the circular airway for the reason that there is less rubbing surface with an equal area and to prove it we will find the perimeter in each airway:

$$100 \div .7854 = 127.323;$$

$$\sqrt{127.343} = 11.283 \times 3.1416 = 35.446 \text{ ft.}$$

in circular airway.

$$10 + 10 \times 2 = 40 \text{ ft.}$$

perimeter in square airway.

In answer to M. E., of Houtzdale, on ventilation, allow me to submit the following solutions:

The quantities passing in the airways A B and C would be in proportion to the formula

$$Q = \frac{\sqrt{P A}}{K S} \times A,$$

but in this case we may assure that P and K are alike in the airways which reduces the formula to

$$\frac{\sqrt{A}}{S} \times$$

then substituting the known values we have for

A airway $\sqrt{30} \times 30 = .78$ relative quantity.

B " $\sqrt{36} \times 36 = .69696$ " "

C " $\sqrt{25} \times 25 = .625$

$$\frac{.78}{.625} \text{ total " "}$$

Then to find the actual quantities passing in each airway we have as follows:

As 2.19196 : .78 :: 50000 : 18554 cubic ft. through A

" 2.19196 : .69696 :: 50000 : 16578 " " B

" 2.19196 : .625 :: 50000 : 14867.5 " " C

$$\text{Total } 49999.5 \text{ cubic feet.}$$

2. How much more resistance will a current of 600 ft. per minute meet with than 500 ft. per minute the air course being the same with a water gauge of 76? What will the w-g be? The water gauge varies, as the square of the quantity and may be worked by the following proportion:

$$\text{As } 500^2 : 600^2 :: .76 : 1.094$$

inches of water-gauge.

3. In driving a heading 200 fathoms long how would you provide for ventilation?

There are a variety of ways by which the ventilation of a heading could be accomplished. If the heading be a level one, a current could often be produced by means of an air sollar. To form an air sollar the floor of the level carrying the tramroad i

raised about 6 inches from the actual bottom of the level and is supported by cross ties resting upon blocks of wood or stone planks are laid over the ties to form a kind of deck, and the whole is rendered airtight by plastering with mud. This will divide the heading into two very unequal portions. Through the lower division of air solar a current of cool and heavy air will pass to the face of the heading where it is heated by the breathing of men and from the heat of the lamps, thus a constant current will be kept up by the air passing out of the level. It could also be ventilated by means of a pump forcing the air into the heading and driving out the foul air.

Yours truly,

STUDENT.

Phillipsburg, Pa., Dec. 15, '86.

Levelling.*Editor Mining Herald and Colliery Engineer:*

SIR:—Would any of your able correspondents inform me which is the best instrument for levelling purposes (to be accurate), and the method of using the same with corrections for curvature and refraction; also the best form of keeping a levelling book?

Yours, &c.,

L.

Pittston, Pa., Dec. 19, 1886.

Man and Horse Power.*Editor Mining Herald and Colliery Engineer:*

SIR:—If you or any of your readers could tell me how many men a horse is calculated to be equal to, in apportioning the air to any split of a mine, I should be very much obliged.

Yours, &c.,

W.

Ashland, Pa., Dec. 15, 1886.

Compressed Air Engines.*Editor Mining Herald and Colliery Engineer:*

SIR:—I shall feel obliged if you or some correspondents will favor me with the address of a few leading collieries where air-compressing engines, fully equipped with tubes, are being used, that could be readily adapted to use a coal-cutting machine, 5 ft. 6 in. to 7 ft. in length, 24 in. high, and 19 in. wide. It requires a maximum of only 16 cubic feet of air per minute at 45 lb. pressure to run it.

Yours truly,

U. S. A.

Hazleton, Pa., Dec. 16, 1886.

Circulation of Water in a Boiler.

The great influence which the circulation of the water in the steam-boiler, when it is in operation, exercises upon its efficiency, its tendency to foul up, and its liability to various annoying defects, does not seem to be fully understood or appreciated by many to whom it is of the greatest importance. Were it not for the fact that heat applied to the under side of a body of water is communicated to it, thereby expanding it and causing it to rise through the colder water and producing a circulation, it would be practically impossible to generate steam in the ordinary manner. The efficiency of any given area of heating surface depends almost wholly upon the perfection of the circulation of the water in contact with it. This will probably be better appreciated when it is stated that the experiment has been performed of immersing a cubical metallic box in water and heating it from the outside. The horizontal upper surface of the box generated more than twice as much steam per square foot of surface as the perpendicular sides, while the bottom or lower side generated none at all. This was due to the fact that the steam bubbles or vesicles, formed in contact with the upper surface, had nothing to interfere with their prompt liberation from that surface, the heated water was equally free to rise, its place being immediately filled by a fresh supply of colder water, thus forming a rapid circulation; the operation went on with greater difficulty in contact with the vertical surfaces, while the lower horizontal surface, the steam as formed would have a tendency to hug the surface, and prevent the contact of water with it, thus effectually preventing any circulation. When the facts are appreciated it will readily be seen how essential it is to the proper performance of a boiler that the water space should be large, and as free from obstruction as possible, in order that the water may have opportunity to circulate freely, and the steam when formed be disengaged rapidly and quietly as possible.

Comparatively few years ago, it was the universal practice to crowd as many tubes into a horizontal boiler as could be gotten into it. They were set in zig-zag rows, to enable the greatest number to be put into a given space, on the theory that the more steam the boiler would make, and the natural consequence was the spaces between tubes and shells, soon became filled up with scale and sediment, the result being overheated plates, and leaky seams and tubes, while the steaming capacity of the boiler was greatly reduced. Of late years, however, the fact is beginning to be appreciated that the tube surface is not heating surface, unless it has plenty of room to act as such, and consequently the number put into boilers of any given size is less; they are arranged in a more rational manner, and as a natural result the boiler steams better, and is more easily kept clean, less repairs are necessary, and the life of the boiler is greatly prolonged.—*The Locomotive.*

ALABAMA MINING.**Coalburg Doings—Increased Coal Output—What is Doing in Coke.**

At a very recent meeting of the stockholders of the Coalburg coal and coke company, the capital stock of the company was increased \$200,000. As rapidly as it can be done extensive improvements are being carried on. The most important of these are the large coal bin and washer. The former will require 100,000 feet of lumber, and when completed will hold 350,000 tons of coal. This washing process will subserve a double benefit; the cleaning of coal and the utilizing of all that kind of coal known as slack. It has heretofore been thrown away, as no market could be found for it. It will be delivered from the screens to the elevator and thence carried by a succession of small cups attached to an endless chain through the washer, and pass from the washer to the bin and from it delivered to the cabs and carried to the ovens, where it will be made into a fine quality of coke. A saving of coal will thus be effected amounting to thousands of tons annually.

Another improvement worthy of note is the immense endless wire rope running into the mines. Its entire length will be 2,200 yards, or one mile and a quarter. It runs over a very high frame work of timber at the mouth of the drifts in order to create sufficient resistance for the machinery to pull it. All the coal from several drifts will be delivered by means of cross entries to drift No. 4 and through it to the elevator and chute at the mouth of the former. It will necessitate the use of expensive machinery to operate these several experiments. In order to create the proper draft for the machinery a chimney seventy-five feet high is being constructed. In it thousands of brick are used.

There are now seventy-six coke ovens burning. This number is being added to by the building of others. All these improvements will require the expenditure of thousands of dollars. It is the purpose of this company to increase the number of their ovens to about 190. The new Williamson furnace is getting its supply of coke from here, and that the quantity of iron it is making is first-class, is sufficient proof of the excellence of the former. The erection of the new furnace by the same gentlemen who compose this company will create a new and heavy demand for all the coke they can make, to say nothing of the demand most likely to come from other sources.

There is embraced in this company's coal possession 13,000 acres, and, allowing 6,000 tons of the output per acre, would make a grand total of 75,000,000 tons, enough to make a huge quantity of first-class pig iron. This coal is but a continuation of the famous Pratt seam. The output of these mines two years ago was 200 tons daily; now it is 800 tons, with a capacity of almost twice as much. This alone is the best testimonial of its capable management. These mines bear the reputation of being the best aired—that is, the air supply is better—in the state.

One hears everywhere he goes the expression of a strong desire to see the mine inspectors appointed. Of course this can but subserve the highest purposes of utility and the safe operation of the mines. Pennsylvania long ago had her inspectors appointed by law, and the good results that have followed have proved the wisdom of such an enactment. Alabama's mining operations have now assumed that magnitude when such officials are a necessity. To have capable officials, whose business it shall be to visit the mines, and see that every precaution consistent with safety to those who work in them for a living is made, is both right and proper. No one could better fill such a position than one whose experience has made it incumbent on him to possess a practical and intelligent knowledge of mines. An intelligent miner, therefore, fills the bill. Among those whose names have been suggested for these positions none appear better fitted for the work than Messrs. James Hillhouse and Isaac Price, of this place. Both of them have often been called on to fill positions of trust and are life-long and intelligent miners. Mr. Price has been inside superintendent for this company several years and Mr. Hillhouse has been called on to give expert testimony in a number of cases where serious accidents occurred. They both have acted with great discretion in cases of serious accidents in mines, and are prepared to suggest such remedies as would prevent them. Their friends would like to see them fill these positions.—*Correspondence Iron Age, Birmingham, Ala.*

A Household Friend.

Never has a publication so thoroughly carried out the true meaning of a family magazine as does *Demorest's Monthly*. It seems to be the aim to make it indispensable in every household. The January number, which has just arrived, still farther carries out this idea, having added a new department, "Our Girls," which will show this portion of the family "some ways of getting the best out of life." The "Household" department is not merely a series of receipts, but is full of practical suggestions. A prize is here offered for the best series of menu for the separate days of the week; and another for the best "Home Art and Home Comfort," and another prize is offered "for the most practical suggestion of remunerative work for women, to be done at home." Many women will watch anxiously to see what this offer will bring forth, as information on this point is just what they are looking for. Published by W. Jennings Demorest, 17 East 14th street, New York.

INDIANA COAL.**Amount of Its Deposits and the Excellence Of Its Use Under Practical Tests.**

As a factor in the general coal trade, Indiana coal does not figure largely, and yet it has certain qualities which warrant the assertion that, making due allowance for its comparatively small area, when compared with the coal fields of Pennsylvania, Illinois, Ohio, Maryland and West Virginia, it will yet take rank far beyond its present position. It has been but a few years since Indiana coal came into prominence, but now well-nigh 2,000,000 tons are mined annually in the little strip of country comprising but a few counties and parts of counties in the western part of the state.

The quality of this coal is little known beyond the limits of the state, though much of it is sold in Ohio and Illinois on the strength of its heating power and apparent complete combustion. As a steam coal, the block or splint coal, second grade, or that which does not require coke with it, in blast furnace, is, perhaps, one of the best in the market, an analysis, by Professor Cox, formerly state geologist, having shown the following results, when compared with a like analysis of first-class Pittsburg coal, under the same circumstances:

Coal.	Fixed Carbon.	Gals.	Water.	Ash.	White.	Coke.	Spec. gravity.	Weight cu. ft.	Heat Units.
Ind. Block No. 1.	58.00	87.00	2.50	2.50	60.50	1.227	76.06	8080	
Best Pittsburg	58.10	84.00	3.00	5.00	63.00	1.292	80.73	7595	

The block coal used was McRea coal, a specimen of ordinary market quality, such as is sold in quantity for domestic purposes, and the Pittsburg gas works coal, which was selected as a standard grade merely, and not for the purpose of comparison. The result showed a small per cent. of superiority in heat producing quality in favor of the block coal, a difference (largely due to freight charges on the Pittsburg) of from 40 to 50 per cent. in the price of the coals also in favor of the block. Had the test been made in Pennsylvania, and the freight added to the price of the block coal instead of the Pittsburg, this difference would doubtless have been eliminated or reversed. The block coal, however, has one very excellent quality, viz., its freedom from sulphur, which users of it for steam purposes claim will work a saving of 5 per cent. on the original cost of the fire-boxes and flues exposed to the flame. On the other hand, according to Prof. Collett, who first gave these facts publicity, other coals will stand winter stocking better than the block, which loses a considerable amount when kept in bulk through the winter, unless well protected.

THE GOLDEN ARGOSY, published by Frank A. Munsey, at 81 Warren street, New York, has just been enlarged to a sixteen page journal. It claims, and we think justly, to be the most fully and most beautifully illustrated paper of its class in the world. Eight pages are largely devoted to illustrations, and these pictures cover a variety and range of subjects that appeal to all tastes. The ARGOSY is finely printed on a handsome cream-tinted paper, and its contributors include the best known names of literature for boys and girls. The tone of its contents is healthy and pure, and it aims to set a high ideal before the youth of the country. The GOLDEN ARGOSY enters its fifth year with a circulation of one hundred thousand copies weekly, and it therefore takes its place in publication of this country, while in the matter of merit it excels them all. We have seen no other journal that gives as much for the money. The GOLDEN ARGOSY is for sale by all news dealers.

The report of the state geologist of Alabama, Prof. Henry McCally, just submitted to the legislature, illustrated the rapid growth of mining in the south. Fifteen years ago coal was not produced in any quantity in Alabama, and in '80 the amount mined reached only 322,934 tons, while last year the total had risen to 2,225,000 tons, or nearly one-eighth of the record of Pennsylvania for bituminous coal six years ago. Six-sevenths of this came from what is called the Warrior coal field, covering several of the northwestern counties drained by the Black Warrior river, and comprising a region about two-thirds as large as the coal area of Great Britain. The state geologist estimates that there are in this coal field more than 100,000,000,000 tons of available coal, which would be worth enough to buy the whole state out 200 times over. The coal is of excellent quality, and is especially valuable from its proximity to vast deposits of iron ore, in the manufacture of which it can be utilized almost where it is mined. The growing concern of Pennsylvania mine owners and manufacturers over southern competition appears to be entirely justifiable.

Some parties are agitating the question of what will become of the reserve salaries kept back from P. & R. conductors. Some of the P. & R. financiers say nothing is known of that reserve. The older officials say that due provision has been made, and that several conductors who honorably quit the company's service received all their back pay. A portion of their pay is kept back, and if any conductor is proven dishonest the entire sum is forfeited.

TRADE REVIEW.

THE COAL TRADE.

Improvement on all sides is the report to be made of the business in anthracite coal. There is no falling off in the demand from any of the quarters where anthracite has made itself at home, while new applicants for the favorite coal come to the front. Investments in coal properties are being made with a freedom and alacrity that bespeaks the utmost confidence in the future of the industry. And it is a trust well placed. With a demand that is rapidly increasing, with steadily improving facilities for shipping, and the best of equipments for preparing coal rapidly and economically, the likelihood of friendly and business-like co-operation between producers, shippers and dealers, there is an absolute certainty of fortunes to be realized from the investments now being made. It is estimated that the sums put into coal lands and improvements during the past two months in this state alone aggregate \$1,000,000, about evenly distributed between the anthracite and bituminous fields.

Much of this boom in coal interests is to be attributed to a corresponding brightening up of the trade in iron. The development of iron-ore land was never more general in Pennsylvania than at the present time. Properties of this kind which had been abandoned are now being worked, and the product is in good demand at largely increased prices over ruling rates a few months ago. Many old furnaces were put into blast during the past month, and preparations are rapidly going forward to erect new ones.

Though navigation closed a fortnight ago for anthracite, most of the collieries have continued to work to their fullest capacity, and the railroads are doing their best, disadvantages of the weather considered, to transport the black diamonds to the city and liue depots. This keeps the supply measurable up with the demand, though the stocks on hand are unusually low for this season of the year, as a study of Mr. Jones' table (elsewhere given) will show. The difference between the November surplus for this year as compared with the same month of last year is a full quarter million of tons, figures that are really startling in their significance and warrant the cheerfulness with which operators and carrying companies look forward to the new year and its possibilities.

The mining and shipping of coal having practically closed for the year, in consequence of the holiday shut-down until after Jan. 1st, the lowness of stock supplies leaves those consumers, whose orders were delayed, in a rather unpleasant dilemma. The break in prices which they were waiting for has failed to arrive, rates being firmly held except for broken at New York, which is reported as a little weak, but more than compensated for in the enlarged demand for chestnut and pea sizes and consequently stiffened prices. Elsewhere the steam sizes of coal have found a ready sale, largely due to the slack supply of bituminous, the trade in which has suffered because of a lack of transportation facilities. The pool talked of for the latter interests is still in the incubating state, and it now becomes possible that it may "die a-borning." The committee on allotments finds its tasks of reconciliation of percentages asked rather beyond its powers of action, while some of the operating parties are suspected of sharp practice in, *sub rosa*, making contracts for next year, and thus cutting the pins out from under their competitors. If true, though, this is a game that may in future prove a Nemesis of evil to its teachers.

If John Jarrett can succeed in his effort to arbitrate and settle the trouble between the coke interests, employers and employed, he will confer on that great industrial region one of the most satisfactory of holiday gifts. The threatened strike of the miners on Christmas day, if carried into effect, will turn what should be a day of rejoicing into one of sorrow and gloom, the heaviest burden of which will fall upon the shoulders of those who are least able to bear it. The coke miners doubtless have some real grievances that require righting, but those can better be remedied by peaceful appeal to the operators, sense of justice than by resort to a strike. There are other demands, however, made by the men which do not seem to be warranted by the contingent circumstances of the case, and on which they should be willing to make some concessions. To engage in a strike at

midwinter is course so serious in its bearings that it ought not to be rashly entered upon.

The total amount of anthracite coal sent to market for the week ending December 11, as reported by the several carrying companies, was 664,303 tons, compared with 753,066 tons in the corresponding week last year, a decrease of 88,763 tons. Total amount of anthracite mined thus far in the year '86 is 30,827,044 tons, compared with 30,274,656 tons for the same period last year, an increase of 552,388 tons. The following statement gives the gross tonnage for each of the leading coal carrying companies for the week ending December 11, and for the year to same date, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R.R.	265,932	454,162	483,491	D 29,329
Lehigh Valley	143,727	233,578	286,769	D 53,191
D. & L. and Western	108,013	423,229	4,792,601	D 52,625
Shamokin	16,942	797,199	986,840	D 189,641
Und R.R. N. J.	44,935	1,652,214	1,895,871	D 43,957
Penna. Coal	16,853	1,407,448	1,390,015	D 17,433
Del. and Hudson	76,577	3,928,572	3,767,628	D 160,944
Pa. and N.Y.	31,757	53,856	73,439	D 17,583
Clearfield Pa.	51,072	2,128,197	2,730,278	D 602,081
Hun and B. Top.	13,061	622,066	692,395	D 19,771
Nor. and Wtn.	13,680	816,698	564,201	D 244,527

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Dec. 11 was 309,353 tons, of which 224,463 tons were coal and 84,893 tons coke. Of this weekly tonnage 234,605 tons originated on the main line of the Pennsylvania railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 14,295,487 tons, of which 10,924,007 tons were coal and 3,371,480 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending December 18, was 259,000 tons, of which 23,400 tons were sent to and 24,000 tons shipped from Port Richmond, and 27,000 tons were sent to and 33,000 tons shipped from Elizabethport. Vessels are reported in fair supply at Port Richmond, and freights are quoted at \$1.05 and discharge to Boston, and \$5.00c. and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at \$5.00 and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending Dec. 11 were 45,077 tons, and for the year to that date 2,391,687 tons, a decrease of 283,997 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—week, 42,488 tons; year, 1,875,191 tons; decrease, 38,027 tons. To Pennsylvania railroad—week, 2,088 tons; year, 231,971 tons; decrease, 162,334 tons. To the Chesapeake and Ohio canal—week, 571 tons; year, 24,525 tons; decrease, 83,634 tons.

Anthracite Coal Tonnage.

John H. Jones sends us the following statement of anthracite coal tonnage for the month of November, 1886, compared with the same period last year.

This statement includes the entire production of anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines.

	NOVEMBER, 1886.	NOVEMBER, 1885.	DIFFERENCE.
Phila'da. & Read. R.R.	1,246,875	1,174,452	O 72,423
Lehigh Valley R.R.	627,332	1,660,514	D 1,033,182
Del., Lack. & W. R.R.	629,108	1,228,237	D 599,129
Del. & Hud. Canal Co.	349,814	974,867	D 625,053
Pennsylvania R.R.	312,204	308,964	O 3,240
Penn'a. Coal Co.	146,528	159,086	D 12,558
N.Y., L. & E. & W. R.R.	65,742	62,964	O 2,778
Total	3,277,636	3,279,116	D 1,479

The following is the statement for the year 1886, compared with the year 1885:

	FOR YEAR 1886.	FOR YEAR 1885.	DIFFERENCE.
P. & R. Railroad	10,687,453	10,515,064	O 172,389
L. V. R. R.	5,587,536	5,478,388	O 109,148
Del. & L. & W. R.	4,694,388	4,598,890	O 95,498
D. & H. Canal Co.	3,216,854	3,083,043	O 133,811
Penn'a. Railroad	3,190,325	3,092,337	O 97,988
Penn. Coal Co.	1,287,204	1,355,043	D 67,839
N.Y., L. & E. & W.	661,249	575,322	O 85,927
Total	29,012,325	28,534,788	O 477,537

The stock of coal on hand at tide-water shipping points, Nov. 30th, '86, was 393,202 tons; on Oct. 31st, '86, 440,962 tons; decrease, 47,760 tons.

Pittsburg.

From the American Manufacturer.

The rivers have risen again, and there is water enough to send out both "barges" and "boats," but floating ice in large quantities prevents. The weather is extremely cold, and the water will therefore likely soon subside. About 5,000,000 bushels are loaded at mines of the Monongahela ready for shipment. Prices are without change:

PRICES AT PITTSBURGH.

River, wholesale, on board..... 4 @ 5 cts. per bushel.
Railroad..... 4 1/2 @ 5 cts. per bushel.

AT CINCINNATI.

River, wholesale, on board..... 5 1/2 @ 6 1/2 cts. per bushel.

AT LOUISVILLE.

River, wholesale, on board..... 6 @ 7 cts. per bushel.

AT NEW ORLEANS.

River, wholesale, on board..... 28 @ 30 cts. per bbl.

Bushels are rated among dealers here at 76 lb. — 263 bushels make a ton of 2000 lbs., approximately.

The barrel that rules the coal measurement in New Orleans contains 2 4/7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

In the Connellsville coke regions, cars are becoming more plentiful, and are not yet in adequate supply. All other features are unchanged. Blast furnace, \$1.50, f. o. b. cars at the oven; foundry, \$1.75; crushed, 2.25. The supply of cars is good.

Coal Supply.

From the recent reports concerning the discovery of coal in different parts of the world, the question of future supply may for a time be postponed, and the limits that have already been given may be safely extended to a considerable extent. It is true, as has often been stated, that as yet we practically know nothing of the immensity or the value of our vast mineral resources in any direction, much less do financiers, legislators and political economists understand the influence of the development of resources so stable, reliable, indestructible and inexhaustible as those which yield not only a better wisdom but better development of coming generations. A recent report of the state geologist of Alabama, shows an immense coal field in that state which has hitherto been practically unknown, as fifteen years ago, coal was scarcely produced in that State, but the promise of its future development may be indicated by the output last year, which amounted to 2,225,000 tons. The report referred to shows that the Warrior field, as it is called, is about two-thirds as great as the coal area of Great Britain and contains fifty-three seams of coal, the combined thickness of which is over 125 feet. It is estimated that the seams in this field contain 113,119,000,000 tons of coal, worth now at the mouth of the mines about \$150,000,000. These immense deposits in close proximity to vast stores of iron, stone and timber fortell the future position of this locality, as one of the industrial centres of the country. Discoveries of coal have been made near Puget Sound, which in connection with the discoveries of the Canadian geological survey in the Saskatchewan region, of anthracite and bituminous coal, in quantity practically inexhaustible, settle the fuel question of a large part of the northwest portion of this country, which was beginning to assume special interest and importance. Reports also come of extensive discoveries of coal in Texas, Kansas, West Virginia, New Mexico, and other more southern portions of the country. A Chinese paper states that a mining engineer has estimated that in the province of Shansee there is a coal area from which 730,000,000,000 tons can be obtained, and this alone at the present rate of consumption would supply the whole world for 2,433 years. It is said also, that in the Island of Chiloe, belonging to Chili, great deposits of coal of a very superior quality have been made known. The revelation of these vast resources, and the importance of the foundation and support of industrial activity and advancement promises much for the future prosperity and development of our own and other countries.—Chicago Coal Review.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Dec. 18, 1886:

	Week.	Year.
Shipped North.....	52,867 1/4	2,315,862 06
Shipped South.....	65,360 1/2	2,647,595 19
Total.....	118,228 09	4,963,458 01
For corresponding time last year.....		
Shipped North.....	43,454 05	2,354,540 09
Shipped South.....	54,568 17	2,536,086 18
Total.....	98,022 02	4,890,627 07
Increase.....	20,206 07	72,830 14
Decrease.....		

Freight Rates.

The following are the current rates of freight on anthracite coal from Port Richmond, as officially reported Dec. 20, 1886:

To Bangor.....	To Fall River.....
" Gardiner.....	" Providence.....
" Portland.....	" New York.....
" Saco.....	" Baltimore.....
" Washington.....	" 60 @ aig.
" Newburyport.....	" Norfolk.....
" Lynn.....	" 60c.
" 1 1/2 @ dis.	" Richmond.....
" 1 1/2 @ dis.	" 75c.
" New Bedford.....	" 90 & dis.
	" Savannah.....

MARCHING TO THE FRONT.

American Progress in the Iron and Coal Industry—Leading the World.

English iron and steel masters, at their recent gathering, spent much time in discussing the wonderful progress which is being made in this country in our industries. The great advance which has been made in the production of Bessemer steel was particularly dwelt upon. It was considered "simply astonishing" that America should, in the short space of two years, increase her annual ingot capacity from 2,490,000 tons to 4,102,000 tons. The fact was considered still more astonishing that such increase should have occurred during a period of unusual trade depression. When such progress is made under the most unfavorable circumstances, the question was asked, what may be expected of the consumptive and productive capacity of the country when business once more assumes its normal condition of prosperity? The answer seems to worry the British mind in regard to the future of both her home and export trade, in this line of business.

The fear is somewhat mitigated, however, by the expectation that the increased activity on this side will not only keep up but greatly increase the demand for billets, blooms and railroad iron from England, and that the calls from the United States will soon put the now idle English mines, forges and blast furnaces once more into active operation. We trust and fully believe that our friends over the water will be disappointed in this respect, and that our own mines, furnaces and mills will soon be able to fully meet the home demand for iron and steel. High wages and labor troubles generally have seriously interfered with our industries of late, but such things are usually mere temporary hindrances. If neither legislation nor a cessation of labor troubles comes to the aid of our iron and steel producers, there will soon be a large movement in the way of a transfer of the iron industries of the North to the South, where at least unskilled labor is more reliable and cheaper. Whatever may be the need, however great may be the demand, and despite of all labor troubles, the United States will soon prove to the world that her domestic mines and furnaces are fully able to meet all home demands upon them.

Notwithstanding the recent rapid progress of our iron industries, there is every reason to be hopeful of a still greater advance in the near future. Mr. Swank, in his recently published history of "Iron in All Ages," indulges in some of our iron and steel producers, there will soon be a large movement in the way of a transfer of the iron industries of the North to the South, where at least unskilled labor is more reliable and cheaper. Whatever may be the need, however great may be the demand, and despite of all labor troubles, the United States will soon prove to the world that her domestic mines and furnaces are fully able to meet all home demands upon them.

"Our resources for the increased production of iron and steel for an indefinite period are ample, and all other essential conditions of continued growth are within our grasp. We are today ('84) the second iron and steel making country in the world. In a little while we shall surpass Great Britain even in the production of all kinds, and we are destined eventually to surpass her in the production of pig iron. We already consume more iron and steel than any other country. These conditions and results are certainly gratifying to our national pride. They mark wonderful industrial achievements by a young nation in a space of time so brief that we may almost say it dates from yesterday. They are also prophetic of other and still greater achievements."

* * * The saying of Bishop Berkeley, "Westward the course of empire takes its way," has already received a new interpretation, for the iron industry, the source and badge of material power, which had its beginning in Asia, and afterward passed successively to the countries along the Mediterranean, upon the Rhine, and in the east and west of Europe, and thence crossed the Atlantic ocean, now finds a home in the shadow of the Rocky mountains and by the Golden Gate of the Pacific. It has made the circuit of the world."

Of pig iron the British produced in the first half of '86, 3,536,774 tons (of 2240 lbs.), while in the same period the United States produced 2,637,657 tons. The difference is about 900,000 tons in favor of Great Britain, but the significant fact which does not appear on the surface is that the figures representing the production of this country show an increase of 450,000 tons over those of the corresponding period of '85, while those Great Britain are 295,674 tons less than in the first half of last year. This rate of increase will place us ahead of Great Britain before the close of the coming year.

An Interesting Mine Suit.

The Carbon iron manufacturing company is the owner of the Washington Forge mine, Port Orant, which has been almost entirely worked out, no ore remaining, it is said, except some pillars and head ore, which are, however, of considerable value and well worth removing. Adjoining this mine on the northeast is the property of the Lord estate, and near the boundary line the Lord people have sunk a shaft and opened a mine, which is called the West Mt. Pleasant mine. Before this shaft was sunk parties at work in the Washington Forge mine had in two different places accidentally worked beyond the boundary line and into the Lord property. When the West Mt. Pleasant shaft was sunk it struck into the openings thus made and left open

passages between the two mines. There is some reason for supposing that these passages were purposely opened by the Lord people in order to ventilate their mine, but this does not seem to have had much bearing on the case. Afterwards work was abandoned in the Washington Forge mine and it became filled with water, which flowed through these open passages into the Mt. Pleasant mine. In order to remedy this the Carbon iron company kept the pumps going in their Washington Forge mine, which thus became a sort of pumping well for the relief of the West Mt. Pleasant mine. These pumps were driven by the water power of the Washington Forge pond, and in 1884 the Carbon company proposed to sell the Washington Forge property to some parties who intended to take out the pillars and head ore from the mine and remove the pumps and use the water power for other purposes. These proposals the Lord estate applied to Vice Chancellor Van Fleet for an injunction to restrain the Carbon company, or the purchasers of the property, from working out the mine to such an extent as to allow it to cave in; and also to restrain them from stopping the pumps. Some interesting questions upon the law of mining were thus raised. The Lord estate claimed that as the openings between the mines had resulted from trespasses committed by the owners of the Washington Forge mine, the trespassers and any person who might buy from them should be required to protect the West Mt. Pleasant mine forever from the consequences of the trespass. The Carbon company claimed that only the remedy for the trespass was a suit for damages, and that they could not be obliged to keep their mine pumps going forever, in order to free the adjoining mine from water. On the preliminary hearing the vice chancellor granted an injunction to prevent the removal of the pillars of ore out of the Washington Forge mine, but declined to compel the Carbon company to keep their pumps working. And now, after a full trial of the case upon evidence, and after a delay of nearly two years in rendering a decision, the vice chancellor has decided in favor of the Carbon company on both the points, and left them at liberty not only to stop their pumps, but also to take out the pillars and allow the mine to cave in if they see fit. They will probably require the Lord estate to build a barrier of brick work or other material to prevent the influx of water through the openings, and then to pump out their own mine in the usual way. H. C. Pitney represented the Carbon company and Theo. Little the Lord estate as counsel.—*Iron Era, Dover, N. J.*

Completed Finally.

The executive committee of the Reading board of reorganization trustees held a meeting on the 23d, lasting three hours. Everything is now ready for carrying the plan into execution. The final corrections were made to the plan, and it is now said to be in proper shape. A call to stock and bondholders to deposit their holdings in accordance with the plan was drawn up and adopted. It was published in the newspapers on Monday. The creditors and stockholders will be asked to deposit their securities within 60 days, the limit set down in the plan. To make an even date, however, the committee fixed upon the first day of March as the last upon which deposits will be received. Those holders who do not accept the plan within that time will be excluded from the benefits of reorganization, and their holdings will revert to the syndicate. Messrs. Drexel & Co. will receive the general mortgage bonds and Messrs. Brown Bros. & Co. the junior securities and stock. The junior bondholder depositing his holdings will receive first preference scrip as his securities may call for. General mortgage bondholders will receive scrip exchangeable into new general mortgage bonds and stockholders will receive stock scrip. This scrip will be exchangeable into bonds of the new company when issued. All the different kinds of scrip have been printed and are ready for delivery to the proper parties. The scrip is transferable. The payment of assessments will not be required of bond and stockholders at the time the bonds or stock are placed with the depositories. The money will be called for when wanted, and due notice will be given of the time of payment. It is thought probable that it will be called for in installments.

The *Iron Age* makes the following notes from the lately issued directory of the American iron and steel association: All the furnaces in New England now use charcoal. The furnace at West Stockbridge, Mass., was the last to use anthracite, and it has been out of blast for several years. Vermont, which once had several active furnaces, has not had a furnace in blast since '82. There is not now one charcoal furnace in New Jersey, where formerly there were many.

I have been asked the question, "Does friction increase with speed or decrease?" Both. Where the speed is slow, increasing it may decrease the friction per turn; but where the speed is fast, it may be found that increasing speed increases the friction per turn also. There are two sides to almost every question, and particularly so in this case. The more viscous the lubricant, the greater pressure can be carried upon the bearing.—*Grinslaw.*

The *Age of Steel* understands that \$50,000 has been offered for a patent just issued to a Pittsburg gentleman for a rolling mill. The mechanism is simple, and combines both the drawing and rolling processes, accomplishing the work in a rapid and most satisfactory manner.

LABOR TOPICS.

Southern colored miners are being imported into northern mines to underwork white labor.

It is not easily explainable why, with the increased demand for labor, there should be an increase in the number of tramps.

Western gold and silver miners are organizing in a quiet way to better their wages. As a rule a very severe discipline is maintained in the west. The results of mining operations are beginning to be more encouraging. Vast amounts have been lost during the past ten years, but of late operations have been conducted with greater care.

Southern labor, white and black, has been greatly encouraged in the work of organization by the expectation of equalizing wages between the north and the south. Mechanical labor is better paid in the south than it was a year or two ago. A good many northern mechanics going south insist on extra pay for the supposed risks of living in that section.

The British royal commission which has been investigating the cause of the labor trouble in the United Kingdom will conclude its three years' investigation with words like these: "If our position is to be maintained it must be by the exercise of the same energy, perseverance, self-restraint and readiness of resources by which it was originally created." That settles it.

The machinery manufacturers who supply machinery for gold, silver, copper and other mines in the south and southwest have taken more orders for machinery during the fourth quarter of this year than they did the preceding nine months. Agents are now in the north and northeast making extensive contracts for machinery and mining appliances, in order that mining operations may become generally extended during the coming year.

Foreign mill and factory hands are anticipating an advance in wages this winter. The European manufacturers are finding better markets, and labor is beginning to feel that organized efforts will avail them something. The Belgian labor agitation led to efforts among employers in other parts of Europe to prevent a repetition of the results. A slight improvement in wages is in progress all over Europe.

Coal Miners' Wages.

The Pennsylvania miner has no cottage or garden, unless he lives a long distance from his work. His home is usually in a cheaply built wooden house, one of a long row just alike, with outside unpainted and inside unfinished—no cellar, no dooryard, no shade trees about them. Most of these houses have but two rooms, one up-stairs and one down, the lower serving for kitchen and sitting-room and sometimes, when the family is large, for bed-room as well. He lives in a company house on company land and pays rent for the same at varying rates, from \$4 to \$9 per month. His rent is always taken from his wages before he is paid. He must also, as a rule, pay for the coal he burns in his house, in some localities as high as \$2.75 per ton. He works in darkness. In the summer he goes into the mine just as the sun is rising and comes out just as it is setting. In winter he rarely sees daylight at all. It is often so wet in the gallery that his clothes are soaked from morning till night. Sometimes the seam is only three or four feet thick, and he must work in a sitting or reclining position. He is exposed to constant danger from falling rock, fire damp, explosions, or of being buried alive. His work is hard, it is dangerous, it requires skill and ought to be well paid. In fact, however, it is very poorly paid. The average of miners' wages is not greater than those of the ordinary day laborer in Massachusetts. Miners who work on contract, that is, who are paid by the ton of coal mined, in the anthracite mines, earned, in '84, on an average, \$8.54 per week in those who worked by the day, \$7.10 per week; in the bituminous mine, \$7.10 per week. Out of these scanty earnings he must buy his own tools and pay for keeping them in repair, and must also buy the oil and the wicks for his lamps and the powder or other explosives he uses.—*George A. Denison in "Work and Wages."*

An important journalistic enterprise, which will strengthen the bonds of sympathy and knowledge as well as promote the commercial and social intercourse between the north and south, is the extended tours through the gulf states which have been undertaken by Harper & Brothers' representatives for the descriptive and pictorial material for *Harper's Magazine* and *Harper's Weekly*. The first published result will appear in *Harper's Magazine* for January, in Charles Dudley Warner's article on "New Orleans," abundantly illustrated by William Hamilton Gibbons, an ardent traveler. The morning crescent city, with its strange contrast of bustling activity and languid ease—the capital of king cotton, of creoles, and of carnivals—provides a fascinating subject for the northern writer and artist. The article is exceedingly interesting as a fresh and accurate study of the luxuriant metropolis of the south, and will tend to dispel the common misconception of that section. Among the twenty-one illustrations are five full pages, one of them, "A Creole Belle," being the frontispiece of the number. The series of southern articles, which is to be one of the distinguishing features of *Harper's* for '87, will be continued by the same author and artist with a treatment of "The Acadian Land" in the February number.

MINING MACHINES.

Said to Be Proving a Benefit to the Coal Miners of Hocking Valley.

J. Hemmingway writes in the Columbus, Ohio, *State Journal* that the success the coal cutting machinery is having in Hocking valley region is proving to be the greatest blessing that has ever yet fallen to the lot of the coal miner. Instead of machinery portending evil to the miner, it foreshadows a mitigation of the frightful expenditure of strength at the face of both entries and rooms, that has always been necessary to insure a reasonable day's wages, and doubtless sent hundreds of strong men to premature graves. There is no necessity of smaller wages being paid in connection with mining machinery than in connection with the primitive system of manual labor; because, happily, the result obtained from this class of machinery are found not such as to demand the impoverishment of any one in order to make up for the defects of the same. There is a class of inventions which seem peculiarly one-sided as, though the inventor had worked with a "single eye" to the proprietor of the same. But in the case of coal cutting machinery there is mutually in the effectiveness of its labor-executing qualities; and by the machine miners resorting to those milder methods of adjustment of prices, as at present practiced on principles of arbitration, the future may be looked forward to with great hopefulness, and he may rest assured that his future work will be less laborious and the remuneration for the same even beyond his expectation.

The values and descriptions of machines and mining plants have but little, if anything, to do with the present article. It may be stated with more or less propriety that this modern and somewhat peculiar, yet rational method of producing coal, will bear the strictest investigation; and there need be no desire to misrepresent it either on the part of the miner or operator. The system of working the coal, as practised, and seems the best adapted for this class of machinery, may be called the "heavy pillar system," namely: 30 feet rooms and 30 feet ribs, on pillars. The rooms are driven 30 feet in width and contains two wooden tracks, which are laid on the side of each rib, forking at the "jaw" of the room. Presuming the working place to be "squared up," the "coal cutter" is set at the face of the room or entry, the rubber hose is adjusted to the machine, the compressed air valve is opened, and as quick as thought the "cutter bar" is rooting its way under the solid coal to the desired depth, which is six feet. This operation is repeated, the machine clearing 18 superficial feet of floor each cut, till "barring in" is finished. On account of the mathematical precision of the cutting parts of the machinery, the "barring in" or under-cutting is "backed-up" perfectly even, from one rib to the other, and the corners are left as true as a carpenter's square. This may be said to finish the cutting of the working place. The "power drill" is next put into operation and the holes so drilled are directed at any angle, to suit any peculiar notion the miner may have in this respect. The "drillers" are, however, instructed to work to the directions of the miner if so desired. The latter operation completes the work of the machinery, and the coal is now ready for the cartridge and the "match."

The advent of mining machinery brought about an abandonment of the old wasteful, slovenly and haphazard modes of mining coal. As soon as a room has been driven to its boundary, the large pillars (partitions) are attacked with machinery and every vestige of coal is taken out. The spacious ceiling left behind, now supported only by timbers, will groan and bend, and finally quake and settle, shivering everything in its march but the heavy pillars. The coal from these pillars is larger and more sound than from the rooms. This is accounted for on the ground of the pillars being "loose-ended," and requiring but a few inches of powder to do the work. The machine miner now anticipates taking out the pillars as he would any other favored piece of work, while formerly it was a dread to him on account of the danger.

Durham (Eng.) Coke.

(Contracts for large quantities of Durham coke for '86 deliveries have recently been signed, and in nearly every case at prices which show a considerable advance on the rates of the present year. The average price is about 10s. or \$2.42, at the ovens, for a good coke, very nearly \$1 a ton or 60¢ per cent more than the price for good Connellsville coke f. o. b. at the ovens. This price is said to yield a fair profit to the producer. The price, however, that is not a quarter of that paid twelve years ago. It was a little over 10s. for the year '70; it rose steadily to 34s. for the year '73 and after that the fall occurred, and by '79 it had reached 9s. 6d. There was an increase in the average price in the year following, and it has fluctuated a little since; but for the present year it will have been not far removed from the price for '79, whilst there is now every probability that for next year the advance of '80 will be repeated. The output of coke in Durham is well known to be very large; it has not only to supply the needs of the furnaces in the Cleveland ironmas-

ters' district, but it supplies a considerable portion of the needs of the smelters of Barrow and West Cumberland, as well as some of the furnaces in South Yorkshire and Lincolnshire; and in later days Spain has even taken a little coke from Durham, and seems likely to draw more as its smelts its own ores in the Bilbao district, and sends less to other centres, if such should happen. It is evident that the Durham coke is of very high value, otherwise the coke would not be drawn such distances. To Lincolnshire, for instance, the charge for the carriage of the coke from Durham is about 6s. per ton, according to Sir Lowthian Bell; and there is a possibility of the use of the South Yorkshire coke, the cost of the carriage of which is only about one-third that of the Durham coke, so that the quality of the latter and the amount of work that it does, are the determinators of its use—not its low cost. In Cumberland not only is the production of local coke being stimulated, but there are dribbles of coke being imported from Wales; and though the amount thus supplied is relatively small, yet it tends to check the use of that brought from the east coast, and the local makers as they gain experience improve the plant and improve in some degree the quality of the coke they produce. In the south the Durham coke has to meet an increased and increasing competition with coals made in South Yorkshire, and there is as the years go on a greater fitness in the coke of that southern district for the work that it has to do, so that if Durham coke continues to be sent, the quantity will not grow as it has done in the past.

Texas Coal.

Associated press dispatches dated Dallas, Texas, state: E. Arnold, of Henderson county, arrived in Dallas and has met a number of capitalists on a matter of importance in this section. He claims to have discovered immense quantities of coal in Henderson and Smith counties. Three of the strata are in Henderson and one in Smith, and on all he has secured leases for ninety-nine years from the owners of the land on the basis of payment of ten cents a ton for every ton taken out. One of the leases covers probably as thick a stratum as has ever been discovered in this country, the seam of solid coal being twenty-one feet. In many places the coal cropping can be seen on surface. The large seam is about twenty to thirty feet below the surface. The Henderson county strata are close to the line of the St. Louis, Arkansas and Texas railroad, at varying distances of five hundred yards to two miles. The proposed line of the Texas trunk road from its present terminus at Cedar to Athens, runs within a quarter of a mile of them. They are about nine miles from Athens. Mr. Arnold has also discovered a fine seam of coal in Smith county, near the line of the Missouri Pacific road from Mincola. He represents that the quality of coal discovered is superior to that of the McAllister mines in the Indian territory. It is soft coal, some of it between anthracite and cannel, some of it soft brown coal.

"You can't eat your cake and have it," says the old saw; but it does not seem to apply to the newly-invented process for manufacturing fuel and illuminating gas discovered by a Columbian citizen, O. J. man. He takes a barrel of crude petroleum, manipulates it so as to get nearly half a million feet of gas from it, and still has left a residue of lubricator oil possessing a market value equal to that originally possessed by the barrel of oil. If this claim is well based, the new fuel will be able to compete successfully with natural gas, while the illuminating gas companies will have either to greatly reduce their charges or surrender the field. But it is usually the case in such matters that the inventor's claims are not borne out by subsequent experience, and that the new process may be much more expensive and much less efficient than anticipated by the sanguine gentlemen who have paid the inventor a million and a half of dollars for the control of the business in the United States. If, on the contrary, it is all right as stated, it will add largely to our list of millionaires.

More Coal Cars Wanted.

It is bad enough, when coal operators and miners have numerous holidays thrust upon them, as a result of an over-production of coal, or perchance the sluggish state of the coal market; but when the coal trade is in excellent condition, when the demand is brisk of every sign of stamina, when every one engaged in the industry could be busy, it is simply exasperating to be forced into idleness, as is the case in many coal districts, because the product cannot be carried to market. From almost every direction comes the complaint of a scarcity of cars, the inability or negligence of railroads to furnish adequate means for transporting the product where and as required. What are railroads built for if not to facilitate the traffic of the people and, in times like the present, to comply with their duty as public carriers to the very public that have given them their franchises? And it is, the wages of thousands of poor miners and mine laborers are forcibly curtailed and scores of operators are deprived of the benefits which otherwise they might enjoy in consequence of the general prosperity of the country, not because there is no demand for their whole output, but because there are no cars to carry it to market. Of what avail are our great railroads, if in time of need such as the present, they cannot or will not handle the amount of traffic offered them with the promptness required, thus retarding instead of accelerating life and activity in the country? Let us have more coal cars in commission.

MINERAL CONCENTRATES.

It is reported that a rich placer discovery has been made near Flathead lake, M. T.

Most of the iron and steel of Bulgaria, and all the tin, lead and zinc imported are from England.

A dispatch from Victoria, B. C., reports a valuable gold find close to the boundary between British Columbia and Alaska.

In the Queen of the West mine, Wyoming, the vein of mica bearing rock is 1,500 feet long and from 20 to 60 feet wide.

The weekly statement of the bank of France shows a gain of 13,525,000 francs gold and a loss of 1,450,000 francs silver.

From 1860 to 1867 India took silver at the rate of \$75,000,000 annually, more than the whole yearly produce of silver at that time.

England in her Indian dominions is coining about as much silver yearly as the United States does under the operation of the Bland act.

The imports of block lead from Germany to China were 10,000 pikuls last year against 8,000 pikuls in 1884, 12,562 pikuls in 1883; 34,892 pikuls in 1882.

In September 571,220 marks of gold money was coined in the Imperial German mints, making the gold coin in currency now 1,953,940,265 marks.

To the United States the exports of tin in 1884, 1885 and 1886 during the first nine months were 145,051, 155,153 and 188,460 tons respectively.

For the eight months of the present year, excluding all ores the receipts of bullion in Salt Lake City, Utah, have amounted to a total of \$3,755,029.73.

Sulphur was exported from Sicily to Stettin and Danzig to the extent of 22,000 kantars, or from January to August 3,131,000 kantars; 13 kantars going to a ton.

Transmission of Power by Belts.

A correspondent of the *American Engineer* writes to that journal as follows: I wish to call your attention to a peculiar case of transmission of power by belts that was brought to my notice a few years ago by the superintendent of a large manufacturing establishment in southern Ohio—his name now escapes me. He affirmed that the two eight-inch belts, one running upon the other, will transmit more power than the same belts placed side by side, or a 16-inch belt, on a pulley of the same size and running at the same speed. This is a demonstrated fact, though many of our mechanical friends may doubt it. I have as yet no explanation of the fact from any one, and after giving you some account of my experience, I will give you what I think is one reason for it. Something more than two years ago, I was belting up a blast fan for a foundry, and I was overruled by the owners in the question of the size of belt to be used; I wished to take off the first heat on the fan, the quarry of the founding of the establishment. Everything being ready for the blast, it was started, but the belt proved unequal to the work put upon it, and could not drive the fan; there was no time to make a change of belts and pulleys and get off a heat that day, and I suggested the double belt, one upon the other. There was no other alternative and they consented to the trial of it. And old eight-inch belt was at hand and it was put on over the ten-inch belt; on starting again the two belts did the work, melting over eight tons of iron in little more than an hour; this arrangement has been in use ever since. Now why is this so? Is the question the thoughtful mechanic asks. My explanation of the extra amount of work done is this: The inner belt has all the work to do and the outer belt only holds it to its work; the inner belt, creeping by the strain on its working side, makes a tension on the outer belt on the opposite side, and it by this tension holds the inner belt down to the pulley, the increased pressure increases the friction and the amount of work done. A belt running at high speed has a tendency to lift from the pulley on the side it goes on. This is caused by centrifugal action, and diminishes its attractive force by diminishing the pressure on the pulley; this is all overcome by the use of the outer belt. A greater benefit may be expected to result from its use on perpendicular than on horizontal running belts. The theory of this latter action can only be demonstrated by a model showing the friction of belts on different kinds of pulleys.

While silver is rising in value in the market, a silver dollar will purchase no more groceries today, and is actually worth no more for any purpose than it was when the price was put at the lowest figures. This proves the falsity of the charge, so often made during the lowest depression, that the standard dollar was worth no more than the bullion price in the commercial market. If there was any truth in this assertion, it would certainly manifest itself under the present raise. It has, however, kept its level under all circumstances, as perfectly performing its functions under the lowest and beneath the highest rate of its bullion quotation, thus conclusively proving the falsity of the charge that it is dependent upon the metallic value of its currency standard.

Dr. Dudley, the chemist of the Pennsylvania railroad company, has been at work a long time to find what chemicals should be used to purify the water which is used in the locomotive engines. The water along the road is of varying degrees of impurity, and scales and corodes, thus calling for an increased quantity of fuel to generate a given amount of steam. Dr. Dudley's investigations would be of much use to steam users generally.

CLASSIFICATION OF COAL.

How They Are Rated as to Merit in Heat Production and Profit of Working.

The manufacturing and domestic consumers of anthracite are beginning to realize the fact more fully, that the coal purchased for any one year does not seem to burn so freely, does not fire with so little trouble, and does not last as long as that purchased through other years, or *vice versa*. Where coals of different sizes, or from different districts, are offered to the trade by the same or competing salesmen, the question suggests itself, which shall we buy?

Among housekeepers, who are the most numerous class of consumers, though on the smallest scale, distinction is seldom recognized among these anthracites. By other consumers the coals are grouped into those which, when burned, will produce either a white or red ash, special qualities being arbitrarily attached to each. Others, again, know only of three varieties: (1) Those from the Wyoming and Lackawanna fields, or the coals shipped from the northernmost basins over the railroads running through northeastern Pennsylvania direct to New York—notably, the Delaware, Lackawanna and Western, Delaware and Hudson, and Erie railways; (2) those shipped by the Lehigh Valley railroad and the Lehigh and Susquehanna division of the Philadelphia and Reading railroad down the Lehigh valley; and (3) those shipped over the main line of the Philadelphia and Reading railroad down the Schuylkill valley. In special localities, where a favorite coal is largely used, the consumer will speak of one class, composed of his favorite coal, which possibly comes from two or three collieries, with a total aggregate annual production of less than a million tons; and of a second class, composed of the coals from all the other collieries in the anthracite region, represented by an annual production of over thirty million tons. This can be noticed particularly in sections of New England, where even an intelligent consumer will sometimes speak of Lykens valley coal as one kind, and of all other Pennsylvania anthracites as the other kind.

One of the most extensively discussed questions connected with the Pennsylvania anthracite and bituminous regions, and one about which the most unsatisfactory conclusions have been arrived at, has been the classification of the coals. The original division of our Pennsylvania coals into anthracite, semi-anthracite, semi-bituminous, and bituminous, was one founded largely upon their geographical distribution, although the supposed basis was the chemical composition of the coals. These names, as they have been indelibly fixed upon coals produced from special sections or individual mines, will, always, to some extent, be made use of by the coal trade; they have, however, no scientific value. An interesting discussion of this subject was contributed to the transactions of the institute, by Dr. Persifer Frazer, and was subsequently published in report MM of the second geological survey of Pennsylvania. As a result, the following classification is suggested:

CLASSES OF COAL.	Ratio— Vol. II, C.
Hard dry anthracite.....	from 99:1 to 12:1
Semi-anthracite.....	from 12:1 to 8:1
Semi-bituminous.....	from 8:1 to 3:1
Bituminous.....	from 5:1 to 0:1

In arranging the coals under this classification, and many others proposed, the accidental impurities, such as sulphur and earthy matter, are disregarded in the analysis, and the fuel constituents are alone considered. While this classification is probably the best which has been suggested for our Pennsylvania coals, and may be used provisionally as a scientific basis, the coals as at present graded by the coal trade could not be arranged under this or any other chemical classification; and I do not believe that we have sufficient data now at command to suggest a final arrangement which might be considered a scientific rating of the coals, and which would be accepted by the coal miners, vendors and consumers.

The producers and sales agents classify the coal from individual collieries and from a group of collieries under special heads. The individual characteristics which we assigned to each separate coal, are supposed to be dependent upon the appearance of the coal, its hardness, the ease with which it burns, and the color of its ash, or the locality from which it is obtained. In the latter case the geographical name is indicative of the recognized character.

John H. Jones, accountant of the anthracite transportation companies, in his list of collieries which he has been in the habit of publishing annually until the past year, has noted, in addition to other valuable information, as reported to him, of the coal shipped from each colliery. The kind of coal obtained from each colliery has been often arbitrarily assumed by the trade, and the fact that two collieries in the same district have been reported as producing the same kind of coal, has been no certain criterion of the true worth of either coal to the consumer.

In some cases the names which have been given different coals have been unquestionably adopted on account of the favor which they thereby secure with the trade and consumers. It has been found by experience that coal coming for several months from certain parts of the mines, at an individual colliery,

may reasonably be called a red ash; and in a number of months immediately following, when the coal is brought from a different part of the mines, it would more fairly be called a white ash. The name by which such a coal is known, however, may not be changed on account of an absolute difference in the character of the coal, but when the fact is once established that a change in name will warrant a more favorable reception by a certain class of consumers, and that the sales of the colliery can thereby be increased, it will quickly insure a new classification.

The coals of the producing collieries during the year '84 have been classified under the general heads in the following table, which in addition, shows the number of collieries producing each kind of coal, and the amount in tons, and percentage of each.

Character of coal.	Number of collieries.	Production 1884 tons.	Percentage of total production 1884.
1. Free-burning white ash.....	213	17,109,523	52.41
2. Hard white ash.....	105	9,206,639	28.20
3. Wyoming red ash.....	14	1,747,395	5.31
4. Lehigh red ash.....	11	4,319,409	13.13
5. Shamokin.....	29	1,409,854	4.32
6. Lykens Valley red ash.....	8	1,145,008	3.50
7. Schuylkill red ash.....	14	227,467	.71
8. Trevorton.....	2	116,695	.36
9. Lorberly red ash.....	4	101,836	.31
10. Bernice white ash.....	1	86,018	.26
Total.....	401	32,641,499	100.00

Joseph S. Harris, in speaking of the characteristics of the coals produced from the properties of the Philadelphia and Reading coal and iron company in the western and southern fields, defines the characteristics of many of these different varieties. Although his definitions were not intended to include the coals from the eastern, middle and northern fields, yet, in a general way, they may be considered equally applicable to the special coals from the latter fields. His definitions are as follows:

(1) *Hard White Ash*.—"It is in great request for blast furnace and locomotive purpose, having, to an unusual degree, the qualities of resisting change of from under high heat and pressure, and owing to its high percentage of carbon, it is valuable for producing steam; but for domestic use on a small scale, and for open grate fires, it does not ignite readily enough to be a favorite."

(2) *Free-burning White Ash*.—"The distinction between it and the hard-burning white ash coal is, that under such a fire as is ordinarily used for smelting metals or producing steam, the impurities melt or clinker which is not the case with the harder coal. This practical test is not, however, the very exact one. Some of the anthracite can be clinkered with a strong draft and with a thick bed of fire, and would, by a person who used them under such circumstances, be classed as free burning, while another, whose method of burning was more economical, would call them hard. Analysis shows that the free-burning white ash coals are quite as rich in fixed carbon, and that they have even higher heating power, as tested by the amount of water evaporated, than the harder variety, but their limited range of usefulness, which is due to their clinkering, prevents their price rising as high as the hard white ash coals."

(3) *Schuylkill Red Ash*.—"It is easily ignited, easy to keep burning, and is where used in open grates makes less flying dust than white ash coal, because its ash is composed of larger particles, and on account of the oxide of iron, which constitutes its coloring matter, has greater specific gravity than the ash of the white."

(4) *Shamokin*.—"It follows in hardness, and in ease of ignition, next after the free-burning white ash coal, and is used still more especially for domestic purposes, its lower percentage of carbon making it ill-adapted for purposes requiring intense heat."

(5) *Lorberly Red Ash*.—"It burns with a little flame, and is much in request for domestic uses in the eastern market."

(6) *Lykens Valley Red Ash*.—"It burns with considerable flame, and is greatly liked in the eastern market for open grates, other domestic uses, and for steam and heating purposes, wherever quick heat is required."

(7) *Trevorton or North Franklin White Ash*.—"The coal is pure, but its heating properties are rather low, and it is of so friable a nature that it does not stand transportation well."

(8) The Wyoming red ash, (9) Lehigh red ash, and (10) Loyalsock white ash are not referred to in Mr. Harris' report. The Wyoming red ash is similar in its general characteristics to the Schuylkill red ash. The Lehigh red ash is very similar to the hard white ash produced from the same region, with the exception of the color of the ash, due to the presence of iron, the same as in the softer red ash from Schuylkill, while the Bernice white ash, as a fuel, is rated by many coal men as being similar to the Lykens Valley coal, except in the color of the ash. The geological structure and physical characteristics of Bernice and Lykens Valley beds are, however, quite different.—*Chas. A. Ashburner*.

IMPORTANT.

When you visit or leave New York City save Baggage Express and \$3 Carriage Hire, and stop at the GRAND UNION HOTEL, opposite Grand Central Depot. 613 Elegant Rooms fitted up at a cost of one million dollars. \$1 and upwards per day. European Plan. Elevators.

Restaurant supplied with the best Horse cars, stages and elevated railroad to all depots. Families can live better for less money at the GRAND UNION HOTEL than at any other first-class hotel in the city.

Engineer Mary S. Brennan.

The board of inspectors of stationary engineers have granted to Miss Mary S. Brennan the first license to run an engine ever issued to a lady in the United States, if not in the world. Miss Brennan is a Cincinnati lady, and is the matron of the Mt. Auburn Lady's Institute. She is a refined and intelligent young lady, a college graduate, and from her neat appearance and cultivated conversation she is the last person in the world that would be taken for a practical engineer. In speaking of the license she said: "Physics and mechanics always were a favorite study of mine. I tried to master the study of mechanics, and as my love for the science grew, I began to long for practice in preference to theory. My desire to gain this knowledge led me to frequent the boiler room. We formerly had so much trouble with the heating of the building that I determined to remedy the bother; and last summer I went to the boiler-room, and during my inspection I found a crack in the plate and asked that the boiler be repaired. The boiler was formerly under the building, but I did not like the location, so I drew plans and diagrams and had it taken out from under the building and placed under one of the porches. I was compelled to give my personal attention to the heating of the house, and so I concluded to have the machinery fixed to suit me. When the repairs were finished I resolved to take entire charge of the boiler, and went before the board of inspectors and was examined and obtained a license. I have a fireman who does the firing for me. If he is away I start the fire and raise the steam myself. We only use ten pounds of steam in heating the building, and sometimes it runs down to two pounds. I have a steam gauge on the second floor, and can tell at any time just how much steam we are carrying. I am delighted with the duties, and I would like to devote my entire time to the boiler and machinery." E. D. Barman, who examined Miss Brennan, said: "I was surprised when she applied for a license, as I had never heard of a lady having been granted a license to run an engine. The examination was a very rigid one. I asked her the size of the boiler, and she answered at once. I asked her the area of the steam pipe, and she answered in a minute. She quickly told me how to set the safety valve to blow off at any desired pressure; in fact, she answered the questions about as fast as I could ask them, and I couldn't help but give her a license. I know of no law debarring her on account of sex, and I believe she could have compelled me to give her a license under the law if I had refused."—*Cincinnati Gazette*.

English Coal Trade.

An English correspondent of the *Pittsburg Mammoth* writes under date of Nov. 27th, as follows: "The promises to develop into one of the most serious movements which for many years has marked the coal trade of the kingdom, unless wise counsels prevail, has this week been determined upon by the national miners' conference which has been sitting in Manchester under the presidency of Thomas Bart, M. P. After a prolonged discussion upon the question of restricting output the following expression of opinion was passed: "That this conference, clearly seeing that over-production engenders competition to a degree which makes it impossible for workmen in connection with coal and ironstone mines to earn a respectable living, believes, in view of our latent productive ability, that the time has arrived when seven hours' work in all cases constitutes the working day, and further, that each delegate go back to his men and propagate the above as his policy, after which we meet again as a conference (the time to be agreed upon) and arrange, if possible, when the seven hours' system should be commenced." While colliers are threatening their masters with a seven hours' movement, a certain number of the industrialists on Tyne-side continue their agitation to extend the eight hours' movement to that part of the kingdom instead of the nine hours now prevailing. It has been resolved by the promoters to form a labor federation to be called "The National Labor Federation," but so far the organization has not assumed important proportions."

Coal Scarcie in the Northwest.

It is said the northwest was never in such a strait for fuel as at the present time. Almost every town in the Pittsburgh coal field, and in many of them black diamonds are becoming a luxury. The railroad companies are unable to supply themselves with coal and are obliged to confiscate large quantities of coal for their own use. That is given as a reason for the shortage in the public consumption in the northwest. The operators, it is said, have mined this year about 800,000 tons more this year than heretofore, but even with this increase there is a shortage in the market of 1,000,000 tons. The statistics of the coal trade in the northwest for the shipping season just now closed show some remarkable facts. The price of coal for the winter is likely to be higher than ever before. The decrease in stocks over this time last year is \$4,217 tons of anthracite and in eastern soft coal 9435 tons. The decrease in soft coal comes mainly from Pittsburg. The Pittsburgh coal is shorter by 94,133 tons, and the Erie and Brier Hill coal by 71,198 tons over that of last year. The grades which make up the larger part of this shortage are: Ohio Central, 25,386 tons; Shawnee, 30,522 tons, and Younghiough 59,562 tons.

The coal mines of Nova Scotia are very dull and comparatively few of them are running except at intervals.



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-AT-

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FOR THE WEEK ENDING

SATURDAY, JANUARY 1, 1887.

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THE BUSINESS OUTLOOK.

The year '86 went out last night and '87 is ushered in this morning under, perhaps, the brightest business prospects of recent years. The commercial and industrial activity of the past six months has had no parallel in the country's history since '73, and the outlook for the future was perhaps never brighter than at present. The early months of the year just closed were disturbed somewhat by labor difficulties, but the closing months were the most active and profitable to producer and consumer, to employer and employe, of recent years. This prosperity is even greater than most people appear to realize. The actual expansion of domestic trade—and this is the only safe basis upon which to estimate the condition of business—is something almost marvelous. From the principal cities of the country the reports come that the holiday business was the largest ever known, being from 20 to 100 per cent. larger than one year ago.

Legitimate speculation in new enterprises has been slightly checked by the collapse in stock speculation, but a recovery from the shock has already begun, and all the signs point to a period of unusual activity during the year now opening. Labor is quite fully employed for the season, and the rates of wages paid are, perhaps, higher than ever before, when stated in gold. There is a widespread and noticeable disposition to engage in new enterprises—a spirit which has been noticeably absent during the past several years, and which now implies confidence in the future.

Against such signs of substantial improvement there are to be reckoned the dangers incurred by excessive speculation, the dangers arising from unwise legislation and the possible disturbance of the monetary basis. These dangers are not insignificant, but neither are they imminent, yet it would be unwise to make plans for '87 without taking them into account. The expansion of trade during last year is due in a large measure to the expansion of the currency through gold and silver imports. Present indications are that these imports will continue for some time to come, and even should they cease altogether or change to exports, the government has the means to prevent any currency contraction that might be threatened. It is improbable that any legislation inimical to the interests of industries of the country can be secured during 1887, though, no doubt, a year hence another assault will be made on the protective tariff. In the meantime the country will continue to grow in population and industrial prosperity, and unless the monetary basis of all industry and trade is disturbed, it is unlikely that the development of the present will be arrested or confidence destroyed.

The iron industry continues to retain its hold on first place in point of activity and promise. The unusual demand for pig iron noted during the past three or four months shows no signs of diminishing, and the tendency of price is slowly upward. Manufacturers, however, are showing a disposition to prevent prices from booming, all realizing that too high a range of prices during the next six months would so largely increase production as to bring about a dangerous reaction. In other words they have no desire to repeat the experience of seven years ago. Steel rails are in good demand with prices tending upward. There is a danger, however, of more orders going abroad, owing to a still higher price being asked at the mills here. Thirty-seven dollars at the mill is the price now asked, and at these figures orders are certain to go out of the country.

A DOUBTFUL POLICY.

It is beginning to look a little as though President Corbin, of the Philadelphia and Reading railroad, and his office boy, with whose assistance he proposes to run the concern, will get more than the full of their hands of work. The strike on the Richmond branch not only bewilders the new president but paralyzes the traffic on the main lines, and threatens to involve nearly every branch of the road and possibly the miners in this region. The strike was precipitated by the new president's too vigorous and indiscriminate use of the axe, both in the matter of chopping off the heads of officials and employes and in cutting down salaries.

The wisdom of inaugurating a strike at this season of the year, or at any other season, for that matter, may well be questioned, but there are always circumstances which if they do not justify, at least account for such rash movements as this may appear to be.

The right of the management of the road to reduce

the working force to any limit they see fit cannot be questioned, but the wisdom of reducing wages, even in winter, when values are advancing and the general tendency is toward higher wages, is an act that does not seem to be any more justifiable than the act of the railroad hands in striking.

It is a bad season for a strike—bad for the men and worse for the company. And while the former are perhaps somewhat unreasonable in their demands we cannot resist the conclusion that had President Corbin conformed more nearly to the policy of his predecessors in the treatment of the company's employes no strike would have taken place.

We reprint elsewhere an article on "Coal miners' wages," not for any value it contains, but as a striking example of the way in which the case of labor is made ridiculous by those who profess to be its friends and do it justice. There could not be bunched together a greater mass of absolute rubbish than this Denison article referred to, one in which so utter a disregard for facts is evinced. It would be insulting the intelligence of our readers to attempt to point out by comparison the falsity of the statements made. To read them is to preceive them. Why a paper, usually well edited, gives room to such self-evident rot surprises us even more than does the writing of it.

ONE reason why German manufacturers are crowding English manufacturers is that the average length of a German working day is from eleven to twelve hours. The hours are long in spinning and iron founding. Those in charge of machinery and boilers work from twelve to thirteen hours. The average in Leipzig is from ten to twelve hours; in the Silesian district twelve hours at blast furnaces, mines and flour-mills. In the mining industry the rule is continuous day and night work in twelve hour relays, two hours of rest included. In the Bavarian district the daily time exceeds eleven hours.

Coming Reforms in English Mining.

Editor Mining Herald and Colliery Engineer:

SIR:—I am obliged to you for the copy of your excellent paper which reaches me each week, and is always read with much interest. I write also to acknowledge to kind friends of mine amongst your readers who favor me with a goodly number of communications, sometimes wanting information and at other times imparting it, but always alike welcome.

I have nothing very special to write you upon. The coming year will see great changes in English mining. Naked lights in coal mines where gas is at all likely in any quantity will be absolutely prohibited. Lamps will have to undergo some test before they can be used, and many of our now so-called safety lamps will be put out of use altogether.

Explosives of an absolutely safe character, such as the patent water cartridge of Mr. Miles Settle, of Darcy Lever collieries, Lancashire, will be substituted for the very dangerous explosive gunpowder.

The London coal dues which enable the metropolitan authorities to impose a tax upon 10,000,000 tons of coal annually, or nearly as much as the miner is paid who risks his life in getting it will receive notice of abolition.

The English mine rents, which render English made iron four or five shillings a ton as compared with iron made in France and Germany and Belgium, will come up for investigation and reform.

But my special object in writing you now is to wish all my friends in America, and I mean all the readers of the MINING HERALD, a happy and a prosperous new year. Send us prosperity to England. Amongst other occupations during the year now ending I have been re-writing and enlarging my work on "The Mechanical Engineering of Collieries" about which yourself and your readers have spoken so highly. My friends in England and abroad and in the colonies, and wherever mining is a pursuit, have been equally kind. My publishers have now ready the 3d edition of volume 1, and 2nd edition of volume 2, and I can only hope they will be made as welcome in your great country as their predecessors have been.

I am, with couisngly greeting,

C. M. PERCY,
Consulting Engineer.Wigan, England.
Christmas, 1886.

MINE VENTILATION.

Its Theory and Practice as Demonstrated by an English Student.

From the English Labor Tribune.

The temperature of the atmosphere varies with the seasons, and the hours of the day and night, to considerable degree. The temperature of the earth varies only near the surface. At a depth 60 to 100 feet is constant and equal to the mean temperature of the atmosphere, plus one degree. Below this point, the line passing through a series of which is known as the stratum of invariable temperature, it has been found by experiments made in coal pits and artesian wells that a rise of one degree Fahr. takes place for every 50 to 80 feet of descent. According to this the sides of a gallery will be, according to the season, hotter or colder than the atmosphere, and as the internal heat will be greater in proportion to the depth, a longer period will elapse in the case of deep mines; during which the temperature of the atmosphere will be less than that of the mine. The year is accordingly only divided into two parts; that of winter (during which the temperature of the atmosphere is colder than that of the mine; and the summer season, during which we suppose the contrary to take place. There will be, however, some days of transition between the winter and summer seasons, during which we suppose the internal temperature equal to that of the atmosphere. The renewal of the air in galleries and sinking pits is promoted by the property of diffusion of the temperature of the atmosphere, the air in the mine after a certain lapse of time takes that of the sides with which it is in contact. The renewal of the air is much facilitated when there is a great difference in the densities of the atmosphere or external air and that in the mines. If, for example, we sink a pit, and the fissures of the stone give off no gas, the air is unusually abundantly renewed during winter, and with great difficulty on the contrary during the summer. In winter, indeed, the air in the pit is less dense than that of the atmosphere, for it receives from the sides of the pit an increment of temperature which expands it; and it is nearly always saturated with moisture. It rises, therefore, by virtue of its brevity, and is immediately replaced by colder air coming from above, which is warmed, saturated with moisture, and ascends in its turn. If the stone is fissured and evolves fire-damp, this mixing with the air will render it less dense and consequently favor the renewal. If, instead of fire-damp, carbonic acid gas (or stythe) is given off from the fissure, there will be no opposite effect; and, as carbonic acid gas is wholly irrespirable, the natural ventilation becomes insufficient at a very little depth. During the summer, the air in the pit is cooler than that of the atmosphere, and consequently denser, and is very slow of renewal unless there is a considerable evolution of fire-damp. The natural ventilation of a pit is greatly facilitated by infiltrations of water because the drops as they fall drag a little air with them, and determine a down-cast current of air near the sides of the pit while the ascending current is found at the centre, or may lie at a dry side of the shaft. If the pit be of large diameter, the air will circulate much more rapidly. If we drive a drift to the rise, the ventilation will be facilitated when the atmosphere has a greater temperature than the natural one of the stone or coal as the circumstances may be, on account of the conditions exactly the reverse of those indicated above, the ventilation being hotter in summer than winter, because the air entering the drift will ascend and be cooled by contact with the stone, and descend on account of its density, giving place to new volumes of fresh and warmer air. An evolution of stythe will increase the ventilation by increasing the density of air, while an evolution of fire-damp might stop the ventilation altogether by diminishing the density of the air. Exactly opposed results follow on driving a drift to the rise. In a horizontal drift of large area we usually find two currents moving in contrary directions, one on the thill and the other at the roof. During winter the external air enters on the thill, and returns after being warmed by the roof. In summer, on the contrary, the air enters by the roof, is cooled and falls on account of increased density, and leaves by the thill of the gallery. These currents are, however, promoted with greater readiness by having the drift higher than it is wide. Suppose there be two pits united by a series of galleries forming a single sinuous airway which communicates with the air by its two extremities. As the two orifices may or may not be on the same level, if the internal and external temperatures be the same, the two volumes of air in the two pits and their prolongation into the extreme limits of the atmosphere being at the same height and density, there would be no reason for one of the two columns to displace the other—there would be natural equilibrium. But this condition is rarely if ever reached, if it is not during such a small interval of time as to have no practical influence on the ventilation.

(To be Continued.)

The Tennessee coal, iron and railroad company reports 119,196 tons coal and 124,038 tons coke sold during the eleven months to Dec. 1.

Lehigh Valley Coal Tonnage.

The following tables give the shipments of coal over the Lehigh Valley railroad and branches, as reported from the forwarding office at Packerton, Pa., for the week ending Dec. 25, 1886:

Anthracite Coal Received and Forwarded From PENNA. & N. Y. R. R.

AND WYOMING REGION.	WEEK.		TOTAL	
	Tons.	Cwt.	Tons.	Cwt.
Sullivan and Erie Collieries	60	13	154	03
Pleasant Valley do	1,267	02	5,794	04
West Pittston Branch do	2,402	03	5,515	14
Del. & Hud. Canal Co.				
All other Collieries	35,330	09	131,645	09
Lehigh Canal, Mauch Chunk				
Total	39,080	07	143,557	01
Same time last year	26,076	08	133,748	02
Increase	13,009	19	9,808	19
Decrease				

HAZLETON REGION				
For Rail	40,738	18	177,786	01
do do	1,482	00	5,794	04
Lehigh Canal, Mauch Chunk			124	08
Total	42,220	18	183,704	13
Same time last year	49,512	16	226,218	11
Increase				
Decrease	7,291	18	42,514	01

UPPER LEHIGH REGION				
For Rail				
Same time last year				
Increase				
Decrease				

BEAVER MEADOW REGION				
For Rail	17,062	12	65,644	06
do Rail to S. H. & W. R. R.			197	07
do Lehigh Canal, Mauch Chunk				
Total	17,062	12	65,841	13
Same time last year	13,206	01	64,373	06
Increase	3,856	11	1,468	07
Decrease				

MAHANOY REGION				
For Rail	30,740	02	115,599	03
do Lehigh Canal, Mauch Chunk				
Total	30,740	02	115,599	03
Same time last year	28,816	19	130,873	08
Increase	1,923	03		
Decrease			15,274	05

MAUCH CHUNK REGION				
For Rail				
Same time last year				
Increase				
Decrease				

TOTAL ANTHRACITE RECEIVED

From Wyoming Region	39,080	07	143,557	01
do Hazleton do	42,220	18	183,704	13
do Upper Lehigh do	17,062	12	65,841	13
do Beaver Mead. do	30,740	02	115,599	03
do Mahanoy do				
do Mauch Chunk do				
Total	129,103	19	508,702	07
Same time last year	117,060	04	555,213	07
Increase	11,947	15	46,510	00
Decrease				
Forwarded East by Rail from Mauch Chunk	105,148	19	416,989	12
Same time last year	96,319	17	418,729	11
Increase	8,829	02		
Decrease			31,739	13

Distributed as Follows:				
To P. & N. Y. R. R.	18,614	15	69,678	04
To L. & B. R. R. at Lackawanna Junction				
To Del. & Hud. Canal Co., Wilkes-Barre				
To Penna. R. R., South Wilkes-Barre	1,482	00	5,794	04
To S. H. & W. R. R.	677	02	1,554	02
To Individuals above Mauch Chunk	399	12	2,384	17
To Individuals at Mauch Chunk	182	02	600	12
To Lehigh Canal Mauch Chunk			121	08
To L. & B. Div. C. B. R. at Packerton for rail				
To at and above Mauch Chunk for use L. V. R. R.	2,599	09	11,379	04
Forwarded East use L. V. R. R.	3,045	00	13,023	17
Local East of Mauch Chunk	1,986	18	8,061	02
Delivered to Furnaces and Mfg. Companies	16,851	06	63,172	18
Del'd Sch'l & Lehigh R. R.			5	11
" Trouton R. R.	94	04	409	06
" Cat. & Fox R. Rd.	47	01	315	14
" East Penn. R.	17	03	69	13
" Perkiomen R. R.	5,026	05	15,045	12
" Bethlehem Branch P. & R.	2,497	10	10,284	08
" M. & E. Div. D. L. & W. R. R.	1,507	03	4,884	06
" Central R. R.	60	18	291	19
" Penna. R. R. Bel. Div. Wilkes-Barre	27,296	17	124,441	17
" New Jersey Division	46,698	15	167,598	09
" Port Del.			9,393	17
Total	129,103	19	508,702	07

Bituminous Coal Received.

From P. & N. Y. R. R.	38	12	118	16
do all other sources	971	08	3,030	10
Total	1,010	06	3,149	06
Total Anthracite	128,103	19	508,702	07
do Bituminous	1,010	06	3,149	06
Grand Total	130,113	19	511,851	13

COAL DELIVERED TO AND RECEIVED FROM A P. & N. Y. R. R.

Delivered to them,				
From Wyoming Region	17,842	12	66,191	05
do Hazleton do	366	19	2,166	09
do Beaver Meadow Region	59	05	452	16
do Mahanoy do	345	19	867	14
Total	18,614	15	69,678	04
Received from them,				
From Sullivan and Erie Region	60	13	154	03
do Pleasant Valley do	1,267	02	5,241	15
do West Pittston Branch	2,402	03	5,515	14
Total	3,749	18	11,911	12
Total Anthracite Coal	22,364	13	81,589	16
do Bituminous do	38	12	118	16
Total delivered and received	22,403	05	81,708	12

The Colorado coal and iron company has two thousand men at work at the present time.

MINING NEWS.

The Illinois state miners' association expect to hold their next annual meeting at Springfield on the 11th of January.

All the Illinois mines are actively employed, and the shipment of coal to points in the west and northwest is only limited by the car service.

The Summerfield coal and mining company, of Illinois, recently organized, has tapped the famous Trenton seam and expect to have its product on the market about the middle of next month.

It is encouraging to know that the experiment of importing negroes to take the place of white miners is a failure at Grape Creek. At this place the coal company is the party that is striking, and the miners, backed by the protective association and other operators interested in the maintenance of the Columbus scale, will not concede to the demands of operators.

Over in Missouri at Deepwater, the Keith & Perry coal company have extensive collieries; they own 2,000 acres of coal lands, their shaft being sunk about a year ago. At the present time the output of their mine is about 400 cars per month giving employment to 150 miners. This company is preparing to open another mine, and in another month the mining interests at Deepwater will be redoubled.

Work on the St. Louis, Kansas City and Colorado railway is progressing in a highly satisfactory manner. This road would pass through one of the finest coal deposits in Missouri, which is as yet undeveloped, because of its great distance from a railroad and because of excessive freight charges. For almost the entire distance between Holden and Windsor there is a fine bed of coal varying in thickness from three to six feet.

While other localities are making a good deal of flurry over coal discoveries, and the big boomers are expected to follow, a few citizens of Fremont, Nebraska, have quietly gone to work, and have now on the ground the drill and machinery for commencing operations for boring for coal. At Syracuse it is reported that a coal seam has been found. The seam is three to four feet thick. The coal burns bright and clear, leaves a white ash and no cinders. There is a fifty-foot rock with slate formation above the coal seam, fire-clay beneath. The seam is 65 feet below the surface.

Coal's Great Rival.

By invitation Charles A. Ashburner, geologist in charge second geological survey of Pennsylvania, delivered an address on Saturday evening last before the Franklin institute, in Philadelphia, on "Natural Gas." "Gas has been known for centuries," said Mr. Ashburner, "in the province Tsien Lun Tsing, China. Wells have been in existence there drilled some 3,000 feet deep, and gas was conveyed through bamboo pipes and burnt in clay burners. In this country, in 1775, Washington set apart a square mile of territory in Kanawha valley, Va., in which was a burning spring, which he deeded to the public forever. His purpose, however, was defeated. The first record of natural gas in actual use was in the village of Fredonia, N. Y., some forty miles south of Buffalo, where thirty burners were supplied with gas and illuminated the inn when Gen. Lafayette passed through the village in 1821. Gas was known Pennsylvania since the earliest development of the oil regions in 1859. Since this date and until 1881 many gas wells were obtained under varying pressures. In the vicinity of Erie, 100 miles east of Erie, a well was drilled in 1865, from which large flows of gas occurred under a pressure of 600 pounds to the square inch. Until 1881 the only use made for natural gas was for local illumination, for local fuel, and for the manufacture of a high grade lamp black. Ninety-nine per cent. of the gas in the past was absolute waste, since it was permitted to escape without utilization. "It is impossible to get at the exact loss, but approximately it can be said with truth that within the two past decades the amount lost has been equivalent to 100,000,000 tons of coal, which is the present total yearly production of the United States or a little more than the entire production of the Pennsylvania coal fields for two years. This waste was due solely to the fact that there was no method invented for the reduction of the great pressures, ranging from 200 to 600 pounds to the square inch, under which the gas comes from the wells to the requisite pressure of one pound for the mills and two or three ounces for domestic purposes." A geological chart exhibited the different rocks that have yielded gas in Pennsylvania. They are confined exclusively to the Devonian formation and the carboniferous rocks. Mr. Ashburner stated that occurrence of gas had no connection with the occurrence of coal, as popular notion went, but said that idea was the result of partial information and incorrect deduction.

MINE ACCIDENTS.

Joseph Fisher was fatally burned at Lawrence colliery, Mahanoy Plane, Pa., Monday evening.

James A. Gallagher, 18 years of age, employed as a laborer at Silverbrook stripping, near Hazleton, Pa., was killed Monday afternoon by a fall of rock and coal.

Thomas J. Kivler, aged twenty-eight, was crushed to death in No. 1 shaft of the Susquehanna coal company, at Nanticoke, Pa., under a mass of rock.

CORRESPONDENCE.

This department is intended for the use of those who wish to express their views, or ask, or answer questions, on any subject relating to mining they may select. Correspondents need not hesitate to write for supposed want of ability. If the ideas are expressed, we will cheerfully make any needed corrections in composition that may be required. Communications should not be too lengthy and personal reflections should be carefully avoided. All communications should be accompanied with the proper name and address of the writer—not necessarily for publication, but as a guarantee of good faith.

The Editor is not responsible for views expressed in this Department.

Letters should reach the office by Tuesday to secure insertion the current week.

Pumping Time, Pressure, Etc.

Editor Mining Herald and Colliery Engineer:

SIR:—Please, would you kindly insert the following in your next issue, for some of your readers to answer:

1. The quantity of water in the sump of a mine is 20,000 cubic feet; the area of the pump is 150 square inches, double acting, length of stroke 2 feet and 40 revolutions per minute. How long will it take the pump to empty the sump of water, allowing twenty-five per cent. for leakage?

2. If a two-horse power produces 22,000 cubic feet of air per minute, what will be the pound pressure per square foot?

3. What kind of a road is best suited for a double acting incline in the mine, so as to economize room, material, &c.

Yours, &c.,

LEARNER.

United, Pa., Dec. 27, '86.

Covering Steam Pipes.

Editor Mining Herald and Colliery Engineer:

SIR:—I shall be glad if any of your ingenious friends can assist me by giving me their experience in covering steam pipes in a very wet shaft. My shaft is 100 yards deep, the steam pipes are 4 in. diameter in 9 ft. lengths fastened with stays and clamps every 9 yards. In the winter season water pours down the shaft from all sides, and the exhaust steam from a ram pump in the bottom makes matters worse. In the summer season the shaft is quite dry, so that any covering we may put on the pipes can be done in summer, but the difficulty is in keeping it in its place during the winter. If any of your readers can give me advice I should indeed be grateful.

Yours, &c.,

MINING ENGINEER.

Denver, Col., Dec. 18, '86.

Giving the Area.

Editor Mining Herald and Colliery Engineer:

SIR:—As to the question asked by "Young Colliery Manager" I submit the following to his notice:

Question.—A mine with an airway 25 square feet area, 2,000 ft. long, passes 12,500 cubic feet of air, and the number of men employed is fifty, which gives 250 cubic feet of air per man; the extension of the mine adds other 6,000 ft. to the length of the air way, thus reducing the circulating column to 6,250 cubic feet. There are forty more men added to the number of men making a total of ninety men. What must be the area of an airway 8,000 ft. long to pass 250 cubic feet per man, or a total of 22,500 cubic feet, the horse power of the mine remaining the same?

Answer.—The horse power of the mine before the circulating column fell will be the determining factor of the question, as the horse powers also fell along with the column, the pressure remaining the same. Then to find the horse power from the above data will be as follows:

$$\frac{k s v^2 q}{a} = \text{total units,}$$

which is constant; then,

$$\frac{.0217 \times 2,000 \times 20 \times .5^2 \times 12,500}{25} = 108,500;$$

then there is 108,500 units of work, which remains constant. And $a p$ = total units, substitute

$$\sqrt{\frac{a p}{k s}} \text{ for } v.$$

Then as the quantity of air wanted is 22,500 cubic feet, and the total units of work is 108,500; then,

$$\frac{108,500}{22,500} = 4.82,$$

which is the value of P . The equation thus:

$$\sqrt{\frac{a p}{k s}} \times a \times 4.82 = 108,500, \text{ or}$$

$$\sqrt{\frac{.0000000217 \times 8,000 \times 4 \sqrt{a}}{500}} \times a \times 4.82 = 108,500.$$

Then transposing and eliminating the radical signs $4.82^2 \times a^3 = 108,500^2 \times .0006944^2$ or $a^3 =$

$$\frac{108,500^2 \times .0006944^2}{4.82^2}$$

Then by logarithms:

$$\text{Log. of } 108,500^2, 20.1410$$

$$\text{Log. of } .0006944^2, 7.6332$$

Arithmetical computation of log. of 4.82^2 , 5.9020

$$\text{Log. of } a^3, 19.7262 - 10$$

Therefore, $5^{\circ} 9' 7262$

Log. of $a - 1.9452 = \text{log. of } 88.12$ area of airway. Of course this is the area of an airway whose sides are all equal.

Yours Respectfully,

E. P. B.

Durham, England, Dec. 9, '86.

Man and Horse Power.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you kindly insert the following for the benefit of "W"? In proportioning the air to a district you may allow four times the quantity of a man for a horse, thus:—Suppose we allow 200 cubic feet per minute for a man, we would allow $200 \times 4 = 800$ cubic feet per minute for a horse.

Yours, &c.,

VALENTINE.

Xenia, Ohio, Dec. 22, '86.

Arithmetical Questions.

Editor Mining Herald and Colliery Engineer:

SIR:—Will you please to allow me space for a few remarks on the answer given by "Morganian" to the question, what is the 219th power of $\frac{1}{2}$? "Morganian" reduces the fraction $\frac{1}{2}$ to its equivalent decimal .4375, and then says "∴ (4375)^{2.19} = .2536257", and "(4375)² = .19140625 (comparative)", difference = .06195632, or less than the 219th power. Which is equivalent to saying that the 219th power of .4375 is greater than the second power. Now by "Morganian" it has been rightly stated that "(4375)² = .19140625", and I wish to ask "Morganian" or any other of your correspondents, to test by simple multiplication the question, what is the third power of .4375? I presume that "(4375)³ = .083740234375". It appears from the above calculation that the third power of .4375 is considerably less than the second power. Now if the 219th power of .4375 be greater than the second power, and the third power is much less, I wish "Morganian" to show at what point during the increase of the exponent the resulting product changes from increasing to decreasing and ultimately diminishes from .19140625 to .08374023, &c., when the exponent reaches 3. As an illustration of the above, take a very simple example. For instance, the fraction $\frac{1}{2}$, which is nearly $\frac{1}{2}$. Now, $(\frac{1}{2})^2 = \frac{1}{4}$ and $(\frac{1}{2})^3 = \frac{1}{8}$. In this example it surely does not require any great amount of arithmetical knowledge to understand that if the index 2 be increased to 3, and the operations denoted thereby be performed, the resulting product diminishes from $\frac{1}{4}$ to $\frac{1}{8}$. Will any one of your correspondents take this simple question in hand, increase the exponent 2 by any fraction and show that the resulting product is greater than $\frac{1}{4}$, instead of less.

Yours, &c.,

LINLEY.

Pittston, Pa., Dec. 22, 1886.

Wants Them Worked.

Editor Mining Herald and Colliery Engineer:

SIR:—Here is a question. Wish you would put in your paper: Formula

$$T = .03 \frac{P \times D}{50,000} \text{ when}$$

T = thickness of tubing in feet.

P = head of water.

D = diameter of shaft.

Now here is one:

$$T = .03 \frac{196 \times 14}{50,000} .085 \text{ ft.} = 1.020 \text{ in.}$$

What I want is answer to question in "Swinney's Hand-book." No. 12 states that and is all right, but No. 15 has one at 70 yards only makes $\frac{1}{4}$ of an inch, one 90 yards, 1 inch 110 yards, 1 inch and so on. I would like to see them worked out in the paper, for I can't make them suit.

Yours truly,

Shenandoah, Pa., Dec. 26, '86.

Giving the Air.

Editor Mining Herald and Colliery Engineer:

SIR:—I desire to submit the following as an answer to "L" in your issue of Dec. 11th.

A mine having two separate divisions, A and B. The B aircourse is $5' \times 5'$ and 2,900' long and produces 5,000 cubic feet of air per minute; the A aircourse is of a square cross sectional area, 1,000' long and produces 1,000 cubic feet of air per minute. What amount of air will the B aircourse produce when we close the aircourse?

Ans.—We should first find the area of the A aircourse, which may be done thus:

$$\frac{S q^2}{a^3} = \frac{4 \sqrt{a} t q^2}{a^3}$$

Substituting the figures in the question we have:

$$\frac{20 \times 2,000 \times 5,000^2}{25^3} = \frac{4 \sqrt{a} \times 1,000 \times 1,000}{a^3}$$

Transposing this we have

$$\frac{a^2}{\sqrt{a}} = 6.25.$$

Again:

$$\sqrt{a^3} = 62.5.$$

$$a = 5 \times 235 \text{ square feet.}$$

Now if we close the A aircourse its total pressure will be added to the B which will be increased in the ratio of 1 to 1.209.

This increased quantity then will be

$$\frac{q^2}{a^3 P} = \frac{q^2}{a^3 P}$$

substituting the figures again we have:

$$\frac{5,000^2}{1} = \frac{q^2}{1.209}$$

$$\therefore q \sqrt{5,000^2 \times 1.209} = 5,500$$

cubic feet nearly.

Yours, &c.,

GWYLLIM.

Streator, Ill., Dec. 23, '86.

Shaft Dimensions.

Editor Mining Herald and Colliery Engineer:

SIR:—The following is an answer to "A Miner's" question dated Dec. 18, '86:

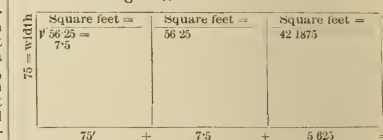
A shaft has an area of 192 square feet, the length = three times the width. What is the length and width of the shaft?

$$192 \div 3 \text{ (times larger)} = \sqrt{64} = 8 \text{ (= width} \times 3 \text{ (times larger)} = 24 \text{ (= length)} \times 8 = 192 = \text{area.}$$

Let us take another illustration where fractional part come in. Supposing a shaft having an area = 154.6875 square feet. The length is equal to $2\frac{1}{2}$ times the width. What is the length and width of shaft?

$$154.6875 \div 2.75 \text{ (times larger)} = \sqrt{56.25} = 7.5 \text{ (= width)} \times 2.75 = 20.625 \text{ (= length)} \times 7.5 = 154.6875 = \text{area.}$$

The following diagram



20.625' = length.

will more fully illustrate the divisions in the shaft, when \div by the lengths times larger than the width.

Yours, &c.,

SMALL CALIBRE.

Peoria, Ills., Dec. 11, 1886.

The Century for January.

The Americanism of *The Century* is exhibited in the make-up of the January number. Except a short communication; it is wholly written by Americans. Its subjects are for the most part American and chiefly those of close and present interest to our people, such as Lincoln and the life of the west in the last generation; the great events of the Civil War; our material standing in comparison with other nations; the Labor question; the Prohibition movement; the need of an International Copyright, etc., etc. Where the subjects are not American, as in the papers on the French sculptors and the French artist, Coquelin, they are closely related to our art by the excellence of the artists considered; and the writers are well-known American critics. Readers of the life of Lincoln, by Nicolay and Hay, will be grateful for the liberal portions of that work which are presented to them from month to month. The current part relates to Lincoln in Springfield; the first clash with Douglas, the Log Cabin and Hard Cider Campaign; Lincoln's marriage; his relations with the speeds of Kentucky; the Shields duel; the campaign of 1844; and Lincoln's devotion to Clay. Among the characteristics of the young politician, it is recorded in his own words that he was opposed to "removals to make places for our friends." The paper has a number of interesting pictures, portraits, and documents. In "Topics of the Time" are three editorial articles: "A Tyranny That Cannot Live in America" deals with the tyrannical and dead-level features of the Labor Problem; "The Blot on the 'Scutcheon'" presents three reasons why the long struggle for International Copyright law should be continued during the present session of Congress; "How Prohibition Grows" is addressed both to the Prohibitionists and to their opponents.

Fourteen thousand square miles in western Pennsylvania, and 20,000 in northwestern West Virginia, are underlain with the richest bituminous coal in the world.

A GAUZELESS SAFETY LAMP.

One of the Latest Improvements in a Valuable Adjunct of Safe Mining.

James McKinness, before the Scottish Mining Institute.

A careful perusal of the "Report of the Royal Commission on Accidents in Mines" must impress the reader with the fact that, notwithstanding the large number of lamps submitted to them, not one reaches the standard of absolute safety.

In page 68 of their report they say: "If a lamp has the property that, when placed in a current of an explosive mixture, the flame and the internal ignited gas are both certainly extinguished in a few seconds, such a lamp must be absolutely safe, but it does not follow that a lamp is unsafe if the gas continues to burn within the lamp."

That no lamp submitted to them fulfills this important condition will be perceived on reference to the published tests, which show conclusively that, under certain conditions, the best of them will continue to burn in gas for an indefinite time.

It should also be borne in mind that in these experiments the gauzes were new, and consequently would offer a greater resistance to the passage of flame than after being some time in use—because oxidation takes place, and every time the oxide is removed by brushing, some parts of the wire of which the gauze is woven will become slightly thinner. The difficulty, therefore, is to determine where safety ends and danger begins, as it is very natural that people will get as much wear out of them as possible, and so long as the mesh appears to be perfect they are likely to be passed as safe. This consideration, coupled with the fact that a very small defect either in the mesh or the fitting parts of a gauze renders a lamp unsafe, convinced me that under certain conditions to be met with in a mine gauze is unreliable, and resulted in the production of a lamp from which it is entirely discarded.

In this lamp the feed air is admitted above the glass and middle ring of the lamp, through very small holes, three times the length of their diameter drilled in a belt or band which forms the base of a cylindrical chimney, and passes thence between this belt or band and the lower portion of an inner conical chimney down to the flame. On the outside of the inlet holes and inside the outer bonnet or shield, a short tube is attached to the middle ring of the lamp, with a flange at the top turned inwards, and the air enters the annular space thus formed through a number of noles of about $\frac{1}{8}$ of an inch diameter, immediately below the flange, but higher than the small inlet holes, which are thus protected from the force of a strong current.

The results of combustion pass through the inner conical chimney—the top of which is a cap or hood to catch the unconsumed particles of carbon or soot—and then escapes through very small holes, also three times the length of their diameter, drilled in a cap which fits the top of the cylindrical chimney.

A theory has been expressed with regard to safety lamps that only sufficient air should be admitted to support combustion, and the outlet should be large so as to give the result of combustion a free escape. But in the lamp now before you that theory is reversed. It has a very large inlet, numbering 800 holes, whereas the outlet holes are limited to half the number. This arrangement secures the utmost illuminating power by supplying abundance of oxygen, makes ample allowance for choking up in dusty workings, and when the lamp is placed in gas it admits a large quantity, which immediately ignites and produces an excess of carbonic acid gas, for which there is not sufficient outlet, and the flame is at once extinguished. In low velocities of an explosive mixture the internal ignited gas will continue to burn for a few seconds, but increases in velocity hastens the extinction, and in high velocities hastens the extinction, and in high velocities it goes out immediately.

The cap containing the outlet holes passes partly through an upper ring or diaphragm, which holds the parts securely in position and prevents the results of combustion from falling down inside the bonnet or shield and re-entering the lamp. In some lamps the burnt gases resulting from interior explosion are in part momentarily retained by the outer bonnet, and the inventors consider it an advantage, as tending to assist in the extinction of the flame by mixing with the feed air. This lamp does not require any such assistance in gas, and, in my opinion, it must affect the lighting power of the lamp in ordinary conditions to some extent.

Robert Winstanley, Esq., mining engineer, of Manchester, said, at a meeting of the Manchester geological society—"Having charge of a colliery, at which an underground fire and explosion occurred in 1884 (the Limehurst colliery, Ashton-under-Lyme), I have had many opportunities of testing this lamp under all conditions. In order to put out the fire, the mine had to be flooded with water, and the re-opening has been a hazardous operation; large accumulations and outbursts of gas

have had to be contended with, and under no condition has the lamp failed, it being extinguished immediately on coming in contact with gas. The lamp has been tested by C. E. Rhodes, Esq., the manager of Aldwarke main and carhouse collieries, Kotherham, at his lamp testing apparatus, and he reported that it stood better tests than any lamp previously tried, as at the highest velocities obtainable it went out immediately, the result being the same in uphill, downhill, and horizontal currents."

It is much to be regretted that this lamp was not perfected until too late for the royal commission, as it not only fulfills the important condition which they consider gives absolute safety, but appears to comply with every other condition they lay down as essential to a safety lamp, except that it has not an appliance to shut off the feed air when in gas, but as it cannot continue to burn in gas, such an appliance is unnecessary.

It gives a good light which is not easily put out. It burns with a full flame at an angle of twenty-five degrees to the vertical and does not go out at thirty-five degrees. It will stand a rapid up and down movement, and even considerable jerking. The inner conical chimney is similar to the Mueseler, but being wider at the base, it is not nearly so sensitive and will bear considerably more canting to one side before going out, though not sufficient to allow the flame to impinge on the glass long enough to break it.

It will indicate the presence of gas in small quantities. It is simple in construction (having few parts, which can be rapidly put together), and admits of much easier inspection than probably any other lamp known; it is only necessary to examine the lead plug (which is the system of locking approved by the royal commission), because with the base of the conical chimney and the cap containing the outlet holes in view, there can be no doubt about any of the parts inside the bonnet.

It is a very useful size, strong and durable, and weighs exactly 3lbs. without oil. The oil vessel holds enough for two long shifts, and, except in dusty workings, it will not require cleaning more frequently. It has been in use by colliers in a dusty mine for shifts of eight hours without inconvenience, and I have had a lamp burning in a room upwards of sixty hours without showing any signs of choking, and it probably will burn another sixty hours before it required cleaning.

It has been stated by an opponent, that these small holes will choke up and be difficult to clean, but a moment's reflection will dispel such fears, as, when it is explained that the holes are barely an eighth of an inch long, it will be evident that by knocking with a hard wire brush they can be cleaned both easily and quickly, and this has been proved in practice.

It will be apparent to any one that the first cost of this lamp will exceed that of some modern lamps, though, with the aid of special machinery, the price has been brought down to 10s 6d each, delivered free to any part of Great Britain; and when it is considered that there are no gauzes requiring renewal, and the saving of time effected in cleaning, putting together, and inspection, these facts will tend to make it a very cheap lamp.

By using a special wick which has been made for this lamp and the compound illuminant recommended by the royal commission, excellent results are obtained at a cost not exceeding a penny per lamp per week, and as arrangements have been made to let the lamp out on hire at a penny per lamp per week, there can be no question on the score of economy.

A large number of firms have given sample orders to try it in the districts where it has been shown (some of whom are already adopting it), and from the evident favor with which it is received, I am led to hope it will eventually come into general use.

On the 18th, in Daly's room in the Mill coal mine near Johnstown, Pa., about two miles from the mouth, a short time before Daly quit work, he made a blast on a "horse-back" in the floor of his apartment. The blast opened a blower of gas and by some means ignited it. The gas inspectors discovered the fire on Monday morning, it having burned with considerable volume all Saturday night and Sunday, and took prompt measures to extinguish it, procuring a pumping engine for the purpose of drawing out the burning coals. By Monday night the fire, which had cooked several tons of loose coal, was got under control, but it was not until the 23rd that the room was declared entirely free from flame. The force of miners, numbering eight or ten, who fought the fire, behaved in a most heroic and courageous manner. John Fulton, chief mining engineer, who was with the men much of the time while they were engaged in their dangerous and difficult task, speaks in terms of the highest praise of their skill and faithfulness. P. E. Chapin, general manager, has directed that each of the men be presented with a five-dollar bill in recognition of their services, in addition to their regular wages.

The manufacturing interests throughout the west are watching the natural gas developments with no small degree of interest. One company, which owns 16,000 acres of gas territory in Kentucky, has leased 20,000 acres more, and is already producing 15,000,000 cubic feet a day from two wells. Fifteen more wells will be sunk as soon as machinery can be had. The syndicate will lay a sixteen-inch pipe across the Ohio river, thence to Irontown and Cincinnati. A powerful vein of gas has just been struck in Indiana. Gas lines are to be laid from the northwestern part of Pennsylvania to Cleveland.

COAL SCREENINGS.

Coal is mined for two dollars per ton near Cerrillos, N. M.

It is claimed that coal has been found in Celebrune county, Arkansas.

The Bozeman coal mines, M. T., are being put into shape for extensive work.

A seam of canal coal, five feet in thickness, was recently discovered near Kaukauna, Wis.

Parties from Idaho are opening a coal mine on Valley creek, about five miles from Park city.

There are fourteen hundred miners at work in and about the mines of Bates county, Mo.

The strata of coal struck by the drill on the Coan farm, at Vinecones, Ind., was very thin.

Westmoreland county, Pa., has fifty-seven soft coal mines, which last year produced 3,774,772 tons.

Coal and coke of Tennessee production now finds a market as far south as Texas and as far west as California.

The coal miners at Mineral Ridge, near Youngstown, Ohio, have been conceded the advance of 10 cents per ton.

For 1885 the actual make of coke was 5,106,696 tons valued at \$7,629,118, and this year the actual make will exceed six million tons.

In the first three quarters of 1885 the imports of German coal amounted to 42,400 and 30,400 tons respectively, a diminution of 12,000 tons.

In Great Britain the chief coal districts—namely, Newcastle, South Wales, and the Clyde country—yield about one hundred and seventy million tons per year.

Pennsylvania Capital in Alabama.

The most important transaction in the industrial history of north Alabama since the announced determination of the Pratt coal and iron company to build four furnaces has just occurred. It will be remembered that early last September a party of Pennsylvanians, from the celebrated Connellsville coke region of the Keystone state, made a visit to Birmingham and spent a few days looking at the coal and iron ore deposits immediately at hand. They announced themselves as well pleased with the outlook, especially with the situation of Smith and Eastman's ore beds and lands, about twelve miles northeast of this city, on the Alabama Great Southern railroad. Messrs. Smith and Eastman made the Pennsylvanians a proposition, and they promised to take it into serious consideration. Among the prospectors were John K. Ewing, a distinguished lawyer of western Pennsylvania, and Robert Hogsett, a veteran iron master and coal operator of the coke region; and F. M. Thompson, president of the Uniontown, Pa., national bank. The party returned home and came back to Birmingham the day before yesterday. On yesterday the arrangements were definitely concluded for immediate organization of a strong iron manufacturing company, of which the *Age* learns the following gentlemen are to be the officers: President, J. M. Thompson; John K. Ewing, secretary and treasurer; general manager, Robert Hogsett; superintendent, a son of Mr. Hogsett. The board of directors will consist of the gentlemen already named, with John K. Ewing, Jr., of Uniontown, Pa., and Messrs. R. D. Smith and E. Eastman, of this city. The company proposes to begin at once, backed by one million dollars capital, the erection of two one-hundred ton hot blast furnaces and an adequate number of coke ovens. The property of the plant as at present comprises 2,000 acres of the richest iron ore of Red Mountain, 600 acres for furnace sites on which are almost exhaustless beds of sand and limestones.—*Birmingham Age*.

COAL AND COKE NOTES.

The soft coal men are confident of forming a pool for the coming year.

The Clearfield region miners have asked for an advance of ten cents per ton.

The anthracite trade this year has exceeded the fondest hopes of the operator.

The amalgamated association of iron and steel workers have refused to join the Knights of Labor.

Coal lands to the value of \$500,000 changed hands in western Pennsylvania during the past two weeks.

A committee of mine boss examiners met in Pittsburgh, Tuesday, to formulate questions for the examinations which take place Jan. 11th.

The H. C. Frick coke company, in the Connellsville region, is repairing its telegraph lines. Copper wire is being put up where smoke is most dense.

An eastern syndicate is negotiating for several thousand acres of coal land between Sutersville on the Yough and Sunnyside on the Monongahela, with a view of operating on the Peemick and the Monongahela river, in Pennsylvania.

Samuel Lowery, of Grant township, Indiana county, Pa., is operating a seam of canal coal, from eight to fourteen feet in thickness. It is used by many people in that vicinity for heat purposes, being much superior to bituminous coal.

TRADE REVIEW.

THE COAL TRADE.

The unexpected is that which, very frequently occurs, and so it is at this juncture in the anthracite coal trade. Just when everything seemed lovely and a smooth future opened out before the interests connected with coal mining, shipping and transportation, there bursts a cloud which may yet deluge the whole fraternity with calamity. This comes in the shape of a strike by the men employed in handling coal at the P. & R. coal wharves at Port Richmond. These men complain that they are not allowed the necessary engines for the moving of cars, that the force of employees has been unreasonably reduced and in consequence more work laid upon those retained in service than they are able to perform. This is a part of the sweeping reform medicine which Economical Corbin has been applying to the Reading system for the past two months, with the purpose of compassing the yearly saving which he boasted his ability to accomplish. That there was room for a broad reformation of management both in the railway and coal and iron business cannot be gainsaid; but as in treating disease one cannot with one prescription or operation effect a successful cure, so in this case it would have been wiser and better for President Corbin to have made haste slowly, and gradually and with more discretion have effected the changes required, than to have sought to achieve the result by one fell sweep that could not fail to work injustice somewhere. Just what may be the exact merits of this strike it is not possible at this distance to positively determine, but reading and analyzing the statements of the contending parties there seems to be valid ground for some complaint by the striking employees. Their course has the endorsement of all the Knights of Labor assemblies along the line of the road, which are said to comprise ninety per cent. of the company's railway employees. In the strike proper at its outset about twelve hundred men were involved, but at this writing it is probable that the entire corps of rail operatives may be ordered out, and if necessary all the K. of L. miners in the company's employ. The result of this strike was to cripple such coal trade as was doing in the early part of the week. During the early part of the week no coal trains were running from Palo Alto to Port Richmond, the crews having been sent home. All loaded cars consigned to Port Richmond at the mines and north of the mountain were side-tracked until further notice. The coal for the furnaces and local points was shifted out and forwarded.

So far as this week is concerned the coal trade proper does not suffer materially, as little or no work has been done or will be prior to Monday, Jan. 1, when the holiday suspension ends. Should the difficulty not be settled this week and the present blockade be raised, the trade must suffer and seriously, too. One week for recreation operators and employees can readily stand, but continued idleness means serious inroads on the financial exchequers of each interest, and later on a rush and roar to catch up that inevitably entails evil.

Were it not for this possible trouble the coal outlook could not reasonably be expected to be better. The coal yards of the anthracite selling quarters are only meagerly stocked, and increased orders may reasonably be looked for in January. New England and western demand is firm, and with the extra supply of cars, now being built, and which should be on the rails in a month, there ought to be no trouble in keeping it supplied and the market stocks down. Coal journals of the "bear" persuasion are retelling the annual bugbear of New England manufacturers stocking up with bituminous rather than anthracite, but the scare has become so worn that it has lost power. So long as extortionate advances are not made in prices and the necessities of the trade are met, anthracite will maintain its basis in the eastern field. The output for January has been fixed at 2,500,000 tons, probably a little high, compared with the amount the markets consumed in the same month last year, which was 2,338,277 tons. The improved condition of manufacturing business is the warrant offered for so large an output. The possibilities of the new combination for 1887 are being discussed by some parties but as the present arrangement continues three months longer, there is ample time for the settlement of the matter. That there will be a combination can scarcely be questioned in view of the excellent results it has worked out in the past quarter year.

There is scarcely a possibility that it will be in any way affected by the Pattison-Cassidy comedy, which has made no progress whatever worth mentioning, and may shortly be regarded as withdrawn from the stage of legal action. The incoming administration will have no need to pose before the public for effect or reputation, and it will hardly care to play out a farce of its predecessor, that has no public sentiment at home to support it. The flatness of the Cassidy failure in this suit could not be better evidenced than in the steady growth and successful ending of the movement to form a bituminous coal combination. This has now been completed and those who are parties to it, are said to have entered heartily into the carrying out of its conditions. With business already in favorable shape and working in unison there seems reason in the expectations of the operators and shippers for a vast improvement in the trade this year, for which all are making great preparations in mining, shipping and terminal facilities.

The threatened strike of the coke workers in the Connellsville region has been averted, a compromise having been effected at a conference of the operators and workers, in Pittsburg. The wages of the workmen will be slightly advanced, and when the price of coke is increased, their wages will be proportionately. The workmen promise to abide by the agreement, and will hereafter discourage petty strikes, such as have annoyed the operators for several months.

The total amount of anthracite coal sent to market for the week ending December 18, as reported by the several carrying companies, was 667,066 tons, compared with 683,035 tons in the corresponding week last year, a decrease of 15,969 tons. Total amount of anthracite mined thus far in the year '86 is 31,494,110 tons, compared with 30,957,691 tons for the same period last year, an increase of 536,419 tons. The following statement gives the gross tonnage for each of the leading coal carrying companies for the week ending December 18, and for the year to same date, compared with the respective amounts carried to the same date last year:

	Week	1886	1885	Difference
Reading R. R.	263,950	718,112	763,960	D 45,848
Lehigh Valley	140,019	379,598	437,607	D 58,009
D. L. and Western	118,222	4,963,458	4,890,627	I 72,831
Shanokin	19,771	816,973	1,011,357	D 194,374
Und. R. R., N. J.	49,943	1,702,158	1,740,527	D 38,369
Penna. Coal	22,472	1,429,921	1,421,820	I 8,101
Del. and Hudson	80,832	4,018,405	3,543,134	I 475,271
Pa. and N. Y.	35,006	91,362	112,768	D 21,406
Clearfield Pa.	48,738	2,176,935	2,792,357	D 615,422
Hun. and B. Top.	11,622	633,688	615,462	I 18,226
Nor. and Wtn.	18,047	834,735	576,553	I 258,182

The Pennsylvania railroad reports that the quantity of coal and coke carried over its lines for the week ending Dec. 18 was 305,634 tons, of which 227,130 tons were coal and 77,504 tons coke. Of this weekly tonnage 233,591 tons originated on the main line of the Pennsylvania railroad, while the remainder originated on its branch lines. The total tonnage for the year thus far has been 14,600,121 tons, of which 11,151,137 tons were coal and 3,448,984 coke. These figures embrace all the coal and coke carried over the road, east and west.

The Reading railroad reports that its coal shipment for last week, ending December 24, was 221,000 tons, of which 17,900 tons were sent to and 14,300 tons shipped from Port Richmond, and 21,000 tons were sent to and 20,500 tons shipped from Elizabethport. Vessels are reported scarce at Port Richmond, and freights are quoted at \$1.25 and discharge to Boston, and \$1.00 and discharge to Providence. There is some coal shipped from the ports in New York harbor, with freights quoted at \$5@90c. and discharge to Boston.

The shipments from the mines of the Cumberland coal region for the week ending Dec. 18 were 55,079 tons, and for the year to that date 2,446,706 tons, a decrease of 268,677 tons as compared with the corresponding period of 1885. The coal was shipped as follows: To the Baltimore and Ohio railroad and local points—week, 52,531 tons; year, 1,927,722 tons; decrease, 18,771 tons. To Pennsylvania railroad—week, 2,548 tons; year, 234,519 tons; decrease, 166,272 tons. To the Chesapeake and Ohio canal—week, no shipments; year, 254,525 tons; decrease, 83,634 tons.

After boring to a depth of 950 feet, in Clinton, Ill., in an ineffectual attempt to discover coal, the scheme, and will go elsewhere. A seam 42 inches thick was passed through at a depth of 550 feet, but this is not sufficient to justify the sinking of a shaft.

Pittsburg.

From the American Manufacturer.

There was coal-shipping water in the Ohio on Sunday, Monday and Tuesday, and about 3,000,000 bushels of coal were sent below. More would have been sent had not ice interfered during a part of the time the freshest lasted. About 3,000,000 bushels are loaded and ready to ship. Prices at Cincinnati and Louisville are weaker, but not quotably lower.

We continue to quote as follows:

PRICES AT PITTSBURGH.

River, wholesale, on board..... 4 @ 5 cts. per bushel.
Railroad..... 3 1/4 @ 5 cts. per bushel

AT CINCINNATI.

River, wholesale, on board..... 5 1/2 @ 6 1/2 cts. per bushel.

AT LOUISVILLE.

River, wholesale, board..... 6 @ 7 cts. per bushel.

AT NEW ORLEANS.

River, wholesale, on board..... 28 @ 30 cts. per bbl.

Bushels are rated among dealers here at 76 lb.—261 bushels make a ton of 2000 lbs., approximately. The barrel that rules the coal measurement in New Orleans contains 2 4-7 bushels of 80 lbs. each, making about 200 lbs. Nine and two-thirds of these barrels weigh a ton, within a small fraction.

In the Connellsville coke regions, the demand for coke is as great as ever, but cars are still too scarce, and in consequence not a few furnaces west of here have been idle for a few weeks, which is a source of great disappointment, in view of the present great demand for pig iron and the profitable prices of the same. The coke syndicate has made the prices for December the same as they are at present, namely: Blast furnace, \$1.50, f. o. b. cars at the oven; foundry, \$1.75; crushed, \$2.25. The supply of cars is good.

Delaware, Lackawanna and Western Shipments.

Following is the report of coal transported over the Delaware, Lackawanna and Western Railroad for the week ending Saturday, Dec. 25, 1886:

	Week.	Year.
Tons.	Tons	
Shipped North.....	42,616-18	2,358,479-04
Shipped South.....	54,528-05	2,702,124-00
Total.....	97,144-03	5,060,603-04
For corresponding time last year.		
Shipped North.....	32,033-06	2,386,573-15
Shipped South.....	32,780-05	2,568,867-02
Total.....	64,813-11	4,955,440-17
Increase.....	32,331-12	105,162-07
Decrease.....		

Freight Rates.

The following are the current rates of freight on anthracite coal from Port Richmond, as officially reported Dec. 27, 1886:

To Bangor.....	To Fall River.....
" Gardiner.....	" Providence..... 1.00 & dis.
" Portland.....	" New York..... 60 & dis.
" Saco.....	" Baltimore..... 60 & dis.
" Portsmouth.....	" Washington.....
" Newburyport.....	" Norfolk.....
" Lynn.....	" Richmond.....
" Boston..... 1.25 & dis. 43c.	" Charleston..... 85c.
" New Bedford.....	" Savannah..... 95c.

Pennsylvania Coal Company Shipments.

Following is the report of shipments of Pittston coal for the week ending Dec. 25, 1886:

Shipped East to tide.....	13,550-19
" " Local points on E. M. & Erie.....	3,945-17
" West via L. S. & Erie.....	5,315-10
Total.....	22,812-06

COAL PROJECTS.

A Toledo, Ohio, company has purchased 150 acres of coal land near Roseville and will open a mine in the spring. They have 500 acres more optioned.

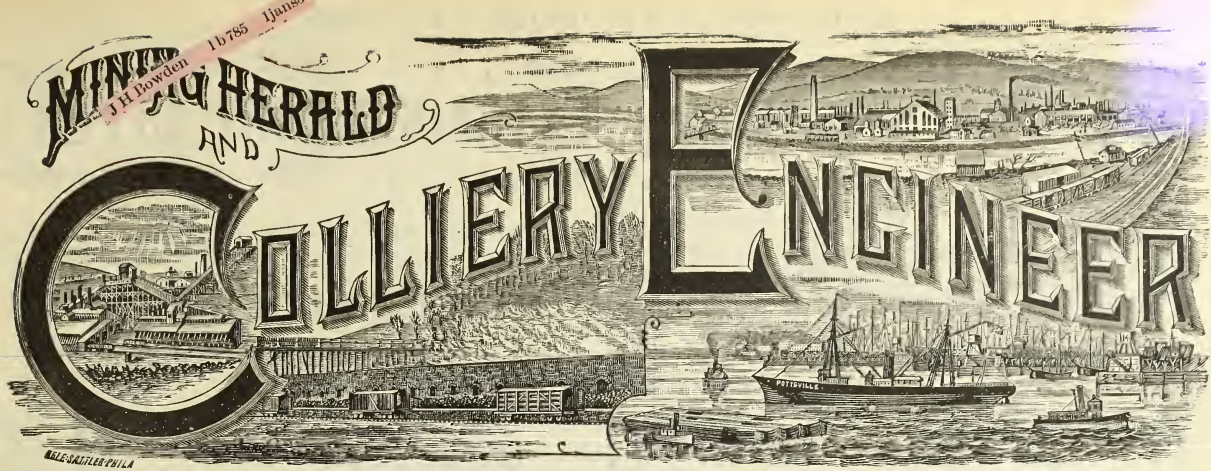
Tremont, Nebraska, has subscribed \$3,500 for the purpose of boring for coal. Norfolk is looking for coal—say they will go 1,500 feet for it. Brownsville is also excited over so-called coal finds.

The Shaner gas coal company has been organized with a capital of \$250,000, and will open works at Shaner Station, Pa., on the Baltimore and Ohio railroad, as soon as a charter has been secured.

The Martin coal district in Cambria county, Pa., is tapped by the Martin branch of the Pennsylvania railroad, south from Portage station. Some 50 coke ovens will be erected in the spring in this district.

The Red Mountain mining and manufacturing company has been organized with a capital of \$300,000, to mine coal and iron ore and to manufacture coke, iron and steel. Its ore lands lie on Red Mountain, south of Birmingham, Alabama.

The Philadelphia and Reading coal and iron company on Tuesday issued line and city circular of prices advancing pea coal fifteen cents per ton and buckwheat twenty-five cents per ton. The new prices for hard white ash coal at Schuylkill Haven will be \$2.65 for lump and steamboat, \$2.75 for broken, egg and chestnut, \$3 for stove and small stove, \$1.40 for pea, and \$1 for buckwheat. The free-on-board prices at Port Richmond will be \$3.85 for broken, egg and chestnut, \$4.20 for stove and small stove, and \$2.35 for pea.



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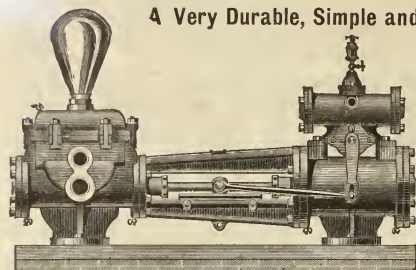
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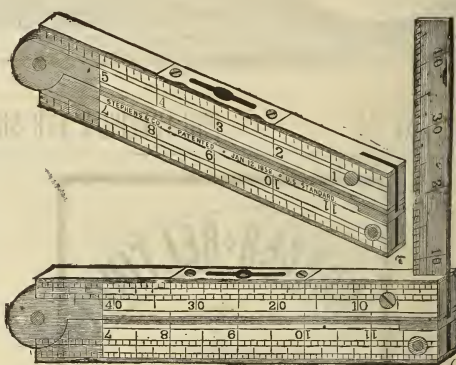
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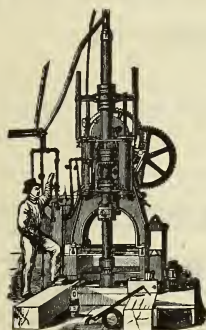
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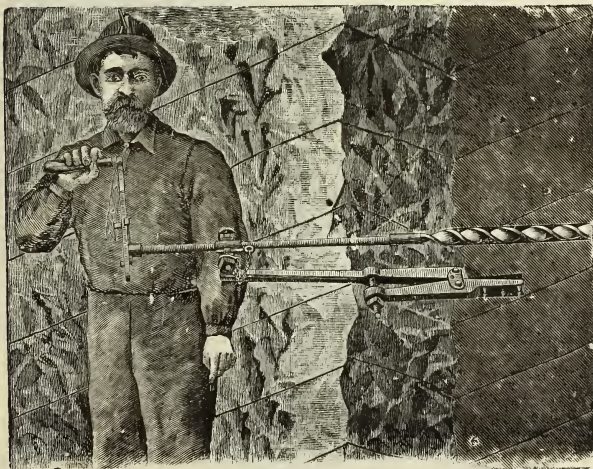
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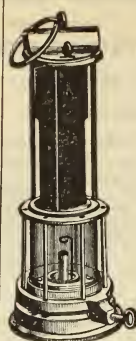
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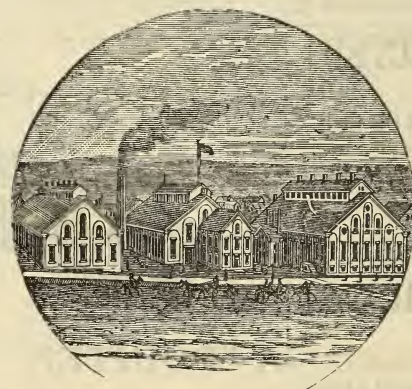
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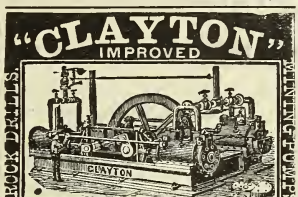
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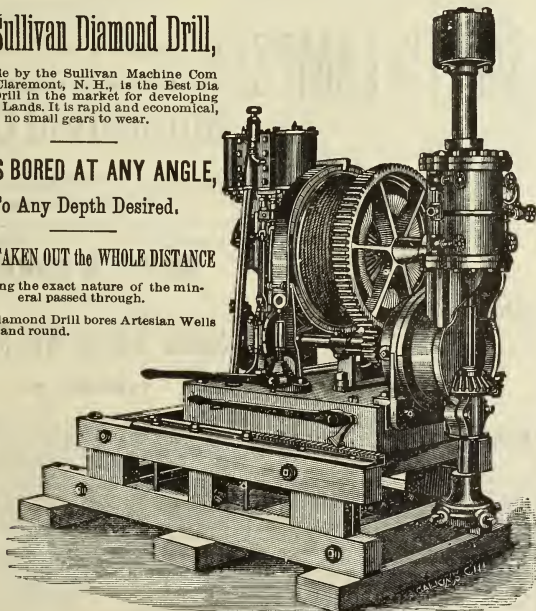
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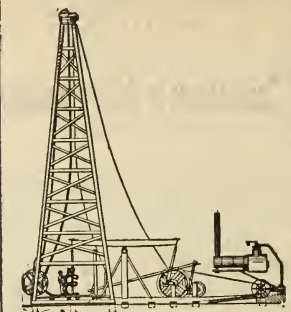
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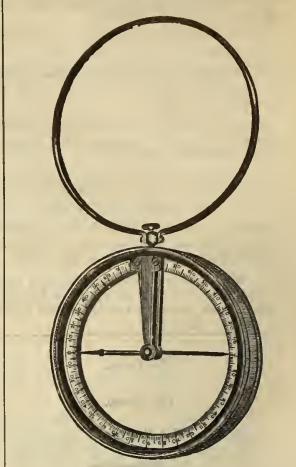
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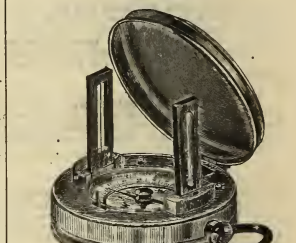
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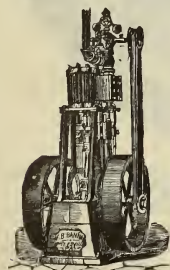
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